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PLANS FOR BUILDING A

Four-Treadle Hand Loom

By FRANKLIN H. GOTTSHALL

HAND WEAVING, one of the principal domestic crafts of early Colonial days, is coming to the fore as a hobby. An increasing number of requests have been received from readers for information on building a high-grade loom. To answer these questions, we asked Mr. Gottshall, who has built many looms, to prepare a set of plans.

Specially designed for home use, it will weave cloth up to thirty-eight inches wide in an endless variety of patterns

INTEREST in the art of hand weaving is rapidly being revived, and justly so, for its value as a handicraft from the artistic standpoint can hardly be overestimated. On a homemade hand loom such as the one shown, Colonial coverlets, throws, runners, table linen, hand bags, rugs, and numerous other articles may be woven, and a great variety of beautiful patterns may be worked out. The covering material for the wing chair described in a previous issue (P.S.M., Dec. '34, p. 68) was woven on this loom, which is large enough for weaving cloth 38 in. wide.

In order that the construction may be more clearly understood by those who wish to build the loom, it will be necessary to explain briefly the principles involved in its operation.

The warp threads, running lengthwise of the cloth, are placed on the loom in such a manner that certain groups of threads may be separated from others, thus allowing the weft threads, which run crosswise, to be woven into the cloth by means of a shuttle. The separating of the groups of thread is called a shed, and is clearly shown in Fig. 2, where the shuttle is about to be passed through the opening of the shed. The shed is made by depressing one or more of the treadles (marked *H* on the drawing) to which the harness of the loom is tied. The harness consists of ropes, pulleys, sticks, and heddles, of which the heddles are the most important part. It is by raising some of the heddles and lowering others that the shed is formed.

Heddles are made by tying two-ply, waxed cotton warp thread into loops, having an eye in the center, as shown in Fig. 4. The heddle, when tied, is about 9 or 10 in. long, and the eye in its center is not more than an inch in length. It is important to make every heddle alike. To do this, drive four nails into a piece of wood, around which the knots may be tied, thus making them uniform. There must be one heddle to each warp thread, which is threaded through the eye of the heddle. Since there are four heddle frames in this loom, each tied to a different treadle, sheds consisting of various combinations of warp threads may be formed by depressing one or more of the treadles. The pattern of the cloth is partly determined by the manner in which the threads are grouped on the heddle frames, and partly

by the order of treading when the cloth is being woven.

As the weft threads are woven in, they are packed as tightly as desired by means of the beater. The beater is a frame holding a series of wires known as a reed *(Z)*, which beats the thread tightly into the cloth, thus completing the weave. One or more reeds are needed, and it is desirable to have at least two. If only two are bought, one should be a 17-dent reed, that is, a reed having 17 wires to the inch. The other should be a 24-dent reed. Since these would be very difficult to make, and as they are inexpensive, they should be purchased from a firm where weaving materials are sold. As the cloth is woven it is rolled up on the cloth beam.

With this explanation of the principles of weaving, it is hoped that the construction of the loom will become clear upon examination of the drawings and photographs.

To make the construction of the loom as understandable as possible, the author has indicated the various members with letters, and named many of the parts directly on the drawing. The reference letters are identical on

the photographs, assembly drawings, and detail drawings. It is, therefore, quite simple to make comparisons and clear up any difficulties as the work progresses.

The wood used for the loom illustrated was birch. Maple may be used. A list of materials is given below to aid in purchasing. The iron parts, with the exception of the pawl, are castings, and wooden patterns must be made either by the builder of the loom or by a pattern maker in the foundry where they are to be cast. The pawl may be made by a local blacksmith.

The frame of the loom is mortised and tenoned together. Each side is assembled with permanent joints,

but the cross stretchers *G* and *P* and the cloth and warp beams are removable. This is a necessary form of construction, because the loom is too wide to go through an ordinary doorway without being taken apart.

The cord used in the harness is a strong, twisted cotton twine, about ⅛ in. in diameter.

The raddle, shown in Fig. 31, is a contrivance used in place of the breast beam when threading up the loom, to regulate and space the threads as they are being rolled on the warp beam.

The rack teeth permit the beater frame to be moved back to suit the convenience of the operator as the cloth is being woven.

The cost of the materials for this light, efficient loom was about $30, including wood, pulleys, canvas, and castings.

List of Materials for Four-Treadle Hand Loom

A. 1 pc. 1½" x 1½" x 49½"
B. 2 pc. ¾" x 1" x 30"
C. 1 pc. 1½" x 1¾" x 46½"
D. 1¼" x 1½" x 49½"
E. 1 pc. 1½" x 2¼" x 44"
Raddle, 1 pc. 1½" x 2¼" x 44"
F. 2 pc. 1¾" x 3½" x 28½"
G. 2 pc. 1¾" x 3" x 48"
H. 4 pc. 1¼" x 2¾" x 22¼"
I. 8 pc. ⅜" x 1" x 40"
J. 2 pc. ½" x ½" x 40"
K. 2 pc. 1¾" x 3½" x 32¾"
L. 2 pc. 1¾" x 3" x 32¾"
M. 2 pc. 1¾" x 3½" x 48½"
N. 2 pc. 1¾" x 3½" x 28½"
O. 1 pc. 1½" x 1½" x 44"
P. 1 pc. 1¾" x 3½" x 48"
Q. 2 pc. 1¼" x 1¾" x 17"
R. Cast-iron fulcrum, 2 req'd (see detail).
S. 4 pc. 1" x 1" x 40"
T. 2 pc. 1¾" x 3½" x 12"
U. 1 pc. 3¾" diam. x 45½"
Cloth beam, 1 pc. 3" diam. x 46"
V. 1 pc. 1½" x 5½" diam.
W. 1 pc. 1½" x 6" diam.
X. 1½" x 1½" x 13½"
Y. 1 pc. 1½" x 1½" x 15"
Z. Reeds—One 17-dent reed 40" long and one 24-dent reed 40" long.
Dowels—¼" and ½"
Ratchet wheel, cast iron, 1 req'd, (see detail, Fig. 23) drilled and countersunk.
Pawl, wrought iron, 1 req'd (see detail Fig. 24).
Rack teeth, cast iron, 2 req'd (see detail, Fig. 26).
Carriage bolts, 4 req'd, ⅜" x 6".
Canvas, 1 1/6 yds. 40" wide.
Small metal plate, drilled and countersunk for screws (see Fig. 22).
Wire pins, 2 req'd (see detail, Fig. 27).
Shuttles, 3 or more req'd (see detail, Fig. 28). The stock for these is 3/16" x 1" x 17".
Canvas sticks, 2 pc. ¼" x 1" x 40" (see Figs. 29 and 30).
Cotton twine, 1 ball, ⅛" diam.
Screw pulleys, 2 req'd, wheels 2" diam. (see Figs. 4 and 5).
Awning pulleys, 4 req'd, 1" single.
Awning pulleys, 4 req'd, 2" double.
Screw eyes, 32 req'd, ⅜" eye.
Heddles, 1,200 (300 to each heddle frame).
Iron butt hinges, 4 req'd, 2" x 2½" with leaves opened.
Handles for ratchet wheel, 2 pc. ¾" x 1" x 10".
Wedge-shaped keys, 6 pc. ¾" x 1" x 4".

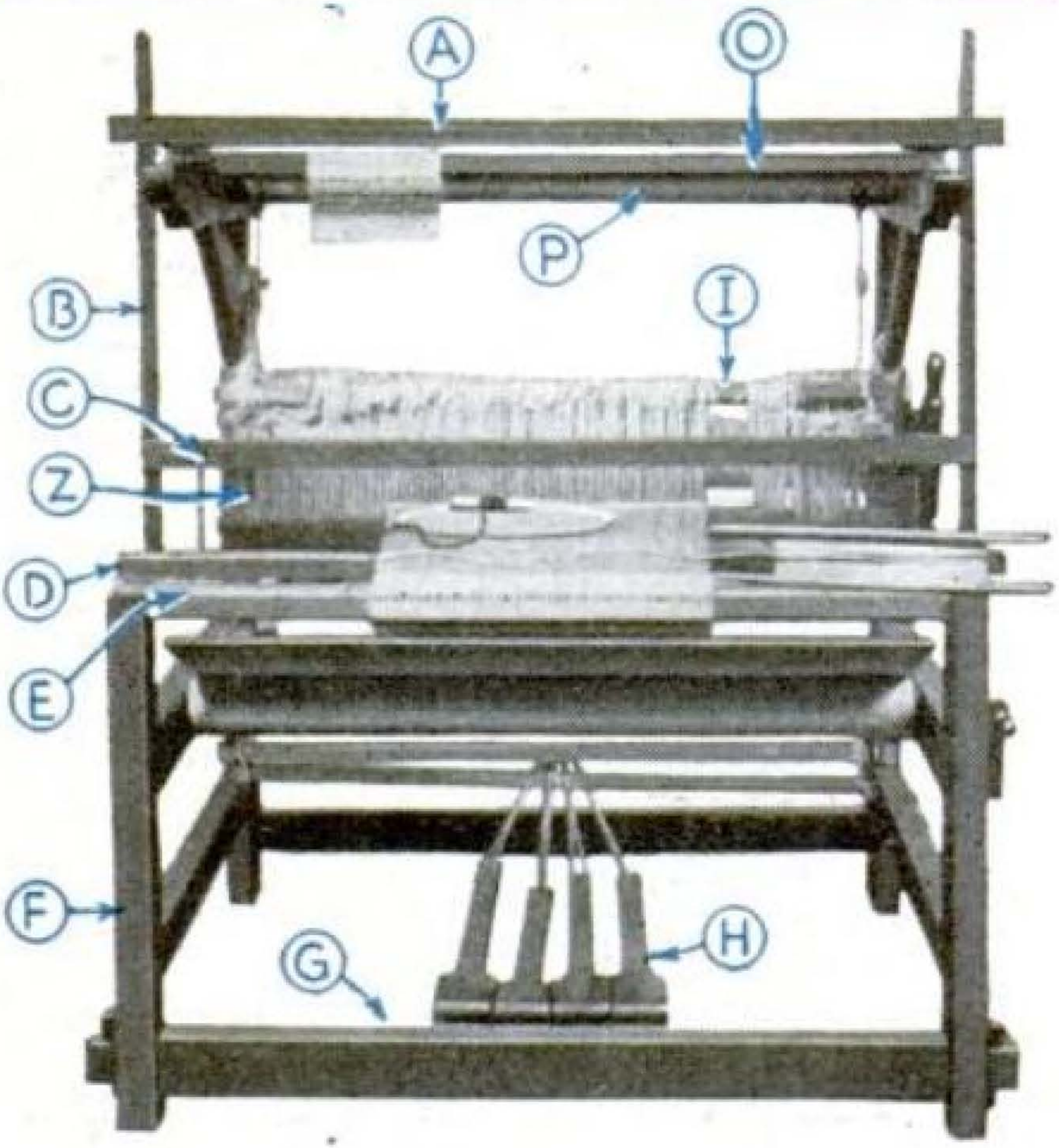


Fig. 1. Photo of the finished loom from the working position. The more important parts are lettered to correspond with the drawings

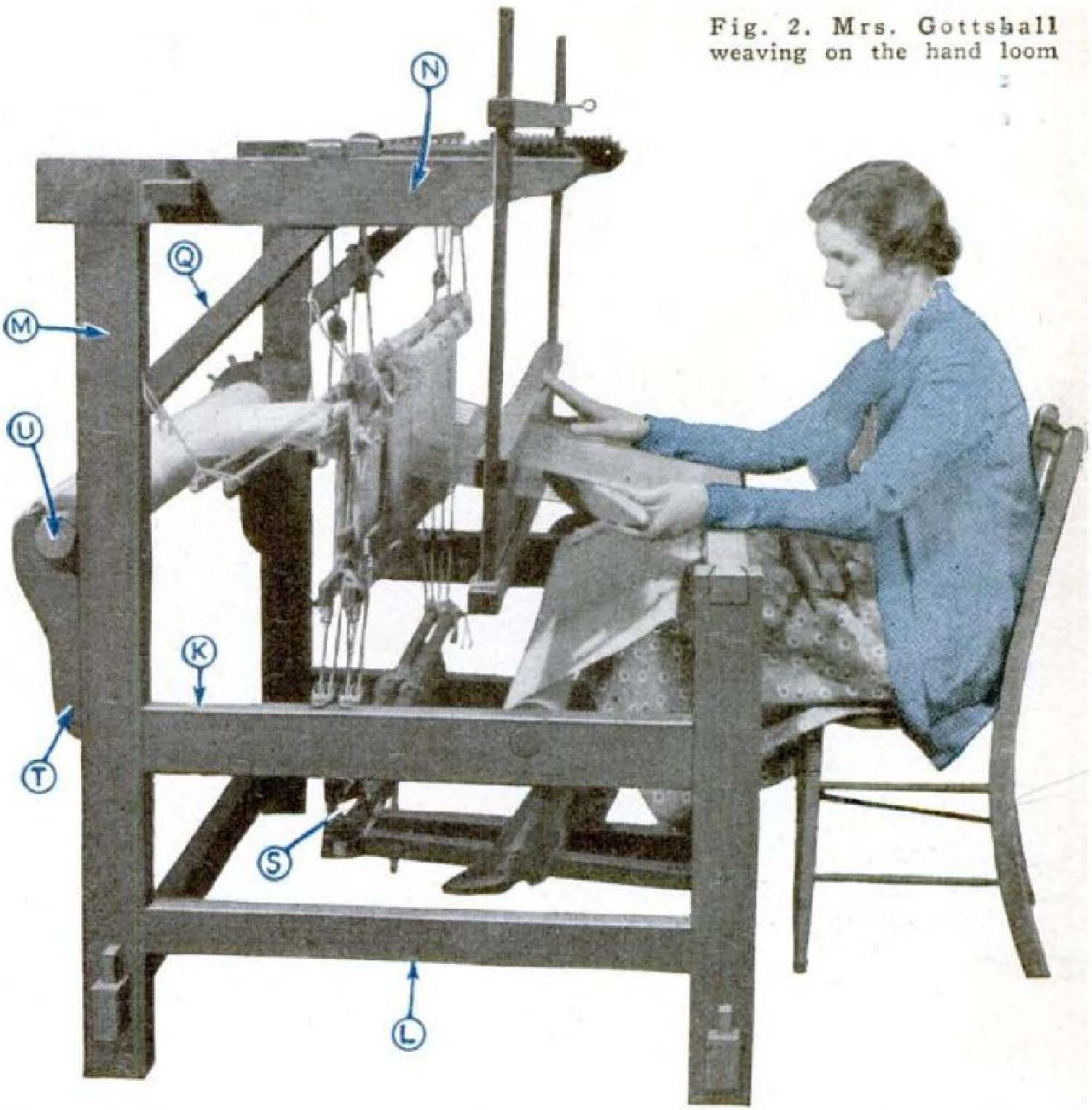


Fig. 2. Mrs. Gottshall weaving on the hand loom

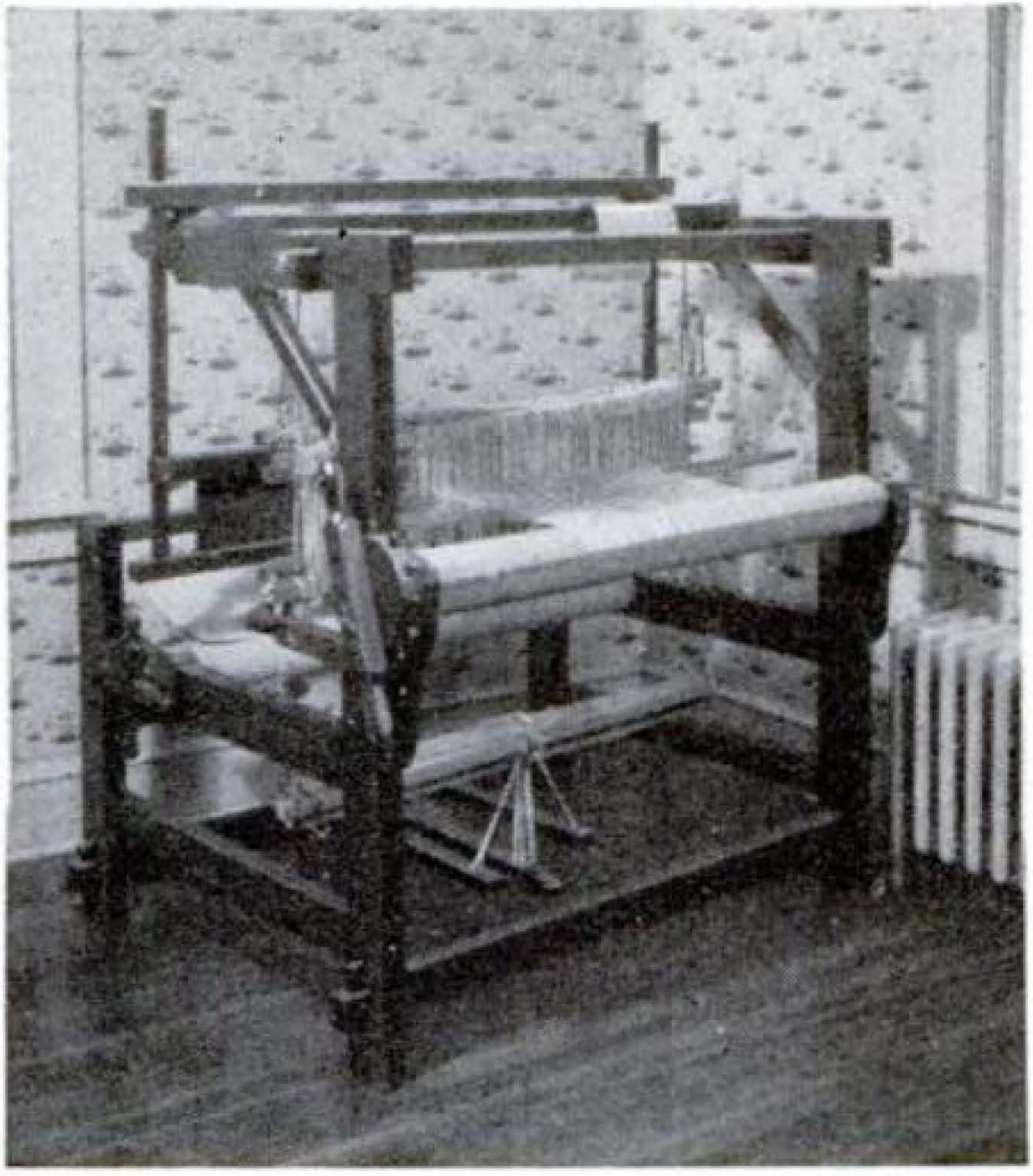


Fig. 3. View showing loom from the rear

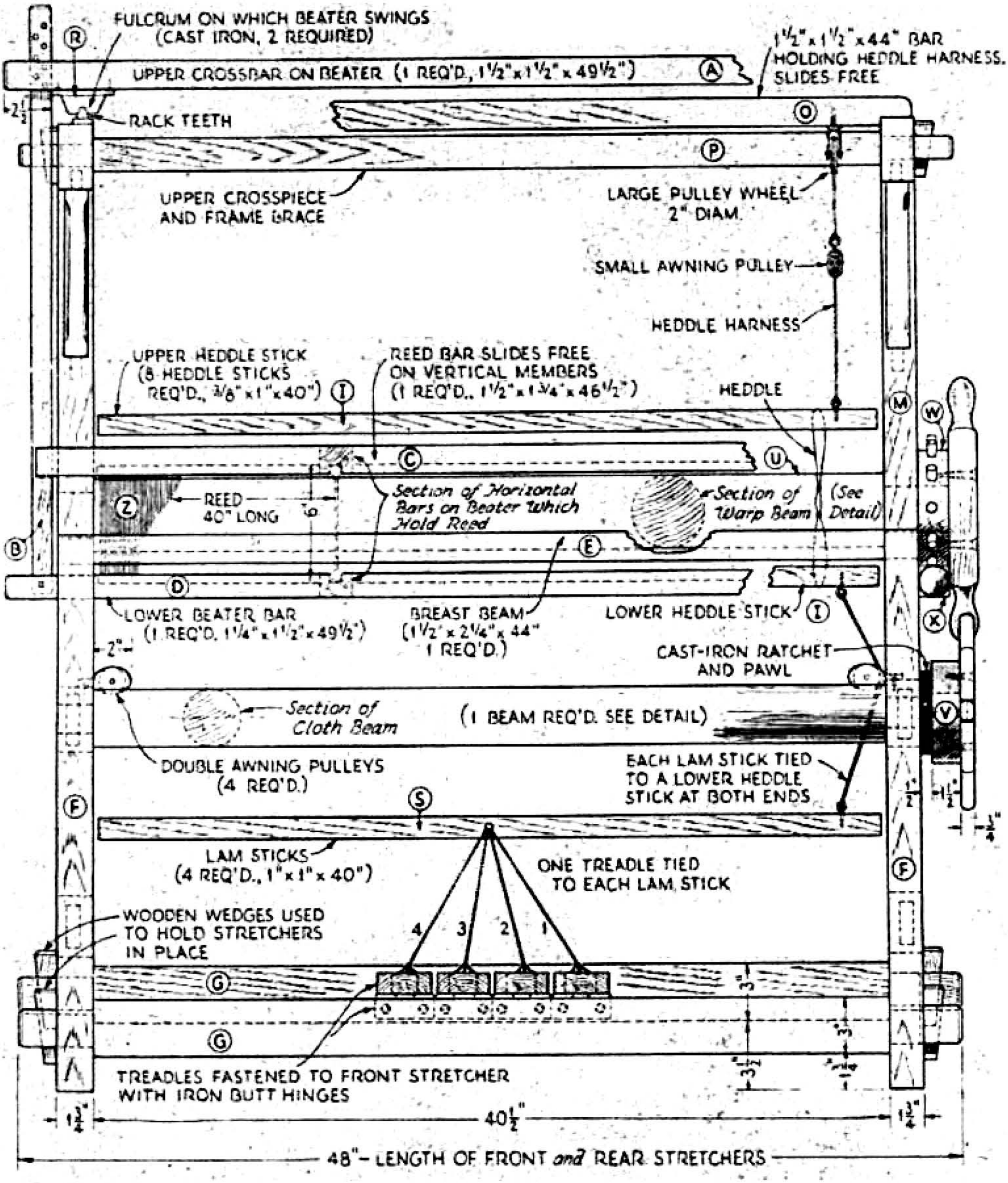

FULCRUM ON WHICH BEATER SWINGS (CAST IRON, 2 REQUIRED)
1½" x 1½" x 44" BAR HOLDING HEDDLE HARNESS. SLIDES FREE
UPPER CROSSBAR ON BEATER (1 REQ'D., 1½" x 1½" x 49½")
RACK TEETH
UPPER CROSSPIECE AND FRAME BRACE
LARGE PULLEY WHEEL 2" DIAM.
SMALL AWNING PULLEY
HEDDLE HARNESS
UPPER HEDDLE STICK (8 HEDDLE STICKS REQ'D., ⅜" x 1" x 40")
REED BAR SLIDES FREE ON VERTICAL MEMBERS (1 REQ'D., 1½" x 1¾" x 46½")
HEDDLE
REED 40" LONG
Section of Horizontal Bars on Beater Which Hold Reed
Section of Warp Beam
(See Detail)
LOWER BEATER BAR (1 REQ'D. 1¼" x 1½" x 49½")
BREAST BEAM (1½" x 2¼" x 44" 1 REQ'D.)
LOWER HEDDLE STICK
CAST-IRON RATCHET AND PAWL
Section of Cloth Beam
(1 BEAM REQ'D. SEE DETAIL)
DOUBLE AWNING PULLEYS (4 REQ'D.)
EACH LAM STICK TIED TO A LOWER HEDDLE STICK AT BOTH ENDS
LAM STICKS (4 REQ'D., 1" x 1" x 40")
ONE TREADLE TIED TO EACH LAM STICK
WOODEN WEDGES USED TO HOLD STRETCHERS IN PLACE
4
3
2
1
TREADLES FASTENED TO FRONT STRETCHER WITH IRON BUTT HINGES
40½"
48" – LENGTH OF FRONT and REAR STRETCHERS
Scale in Inches
0 1 4 8 12 16 20 24

Fig. 4 Front Elevation of Four-Treadle Loom

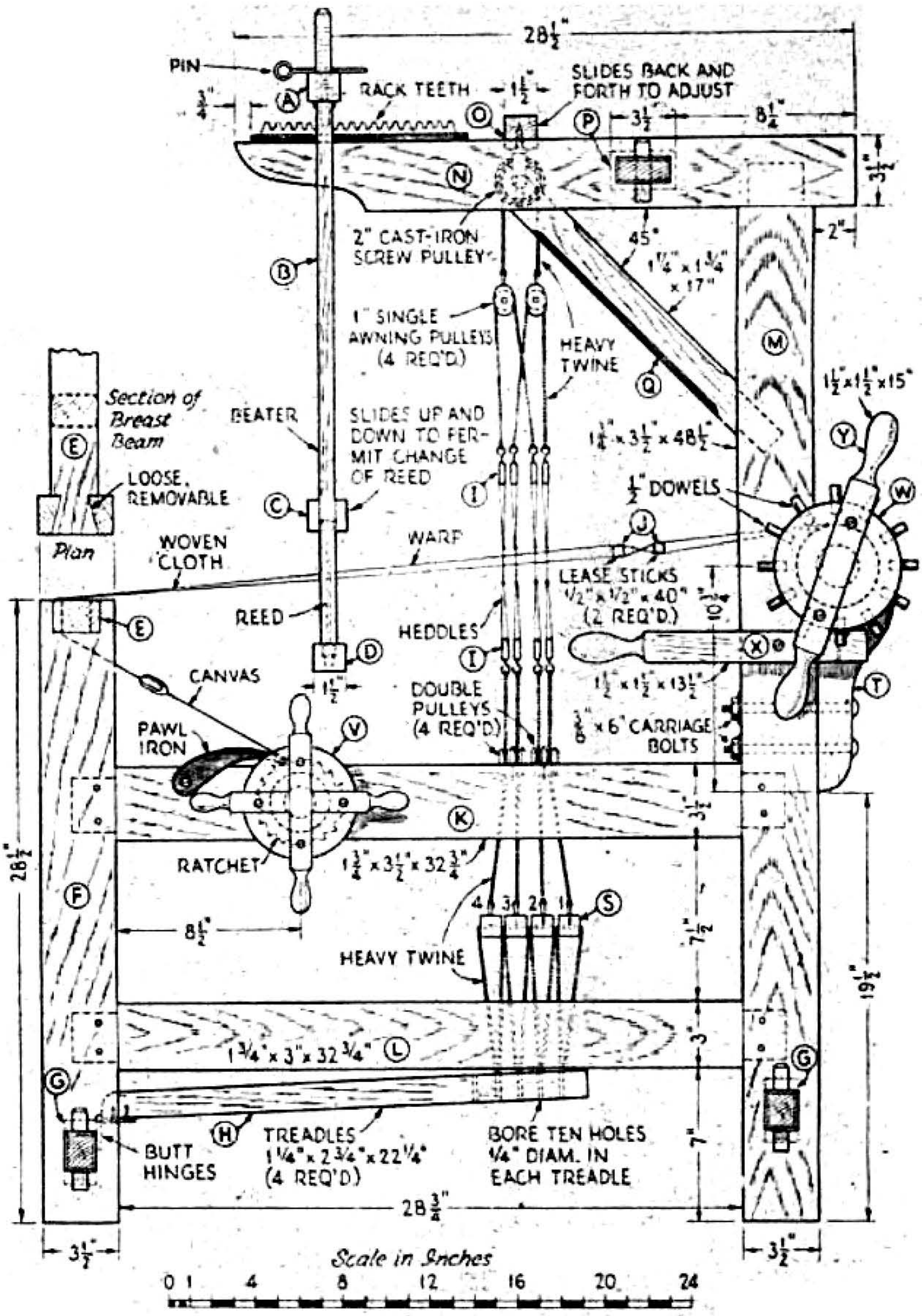
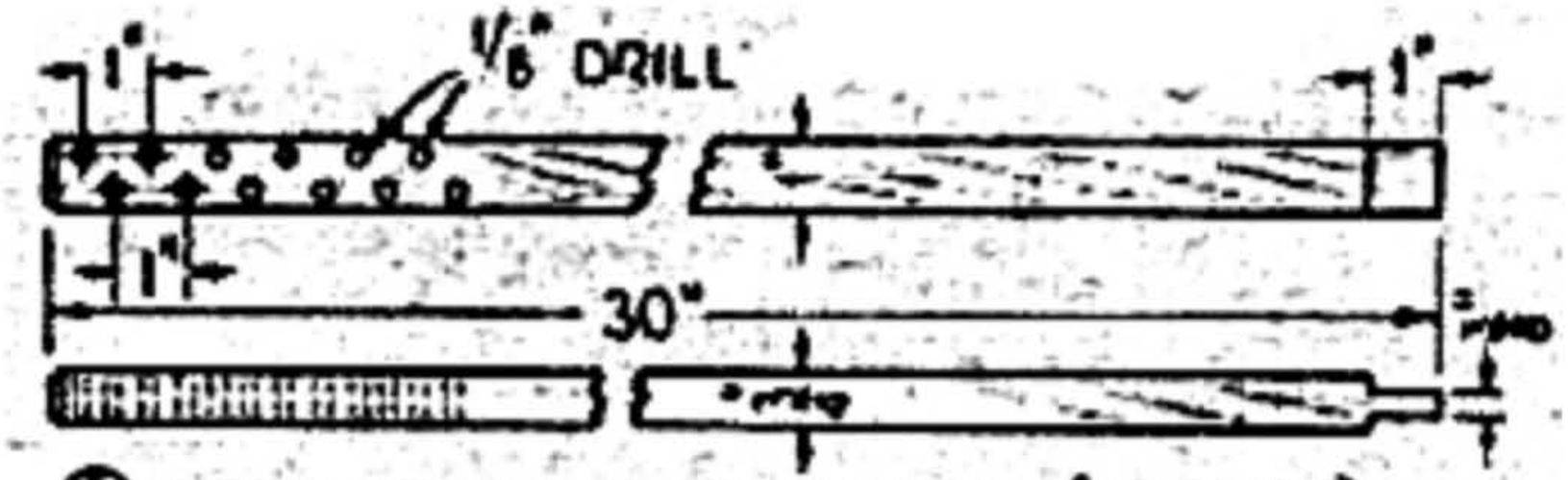


Fig.5 Side View and Threading Plan

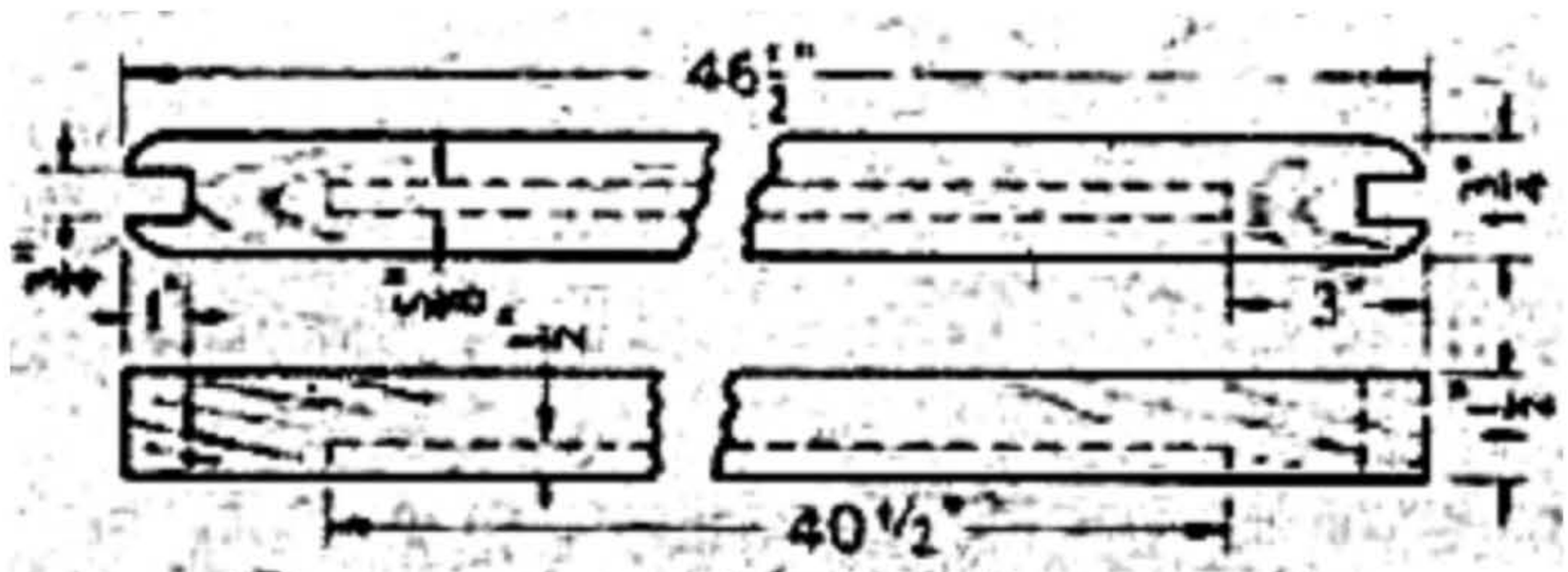
Ⓐ DETAIL UPPER CROSS BAR BEATER (1 REQ'D.)

Fig. 6

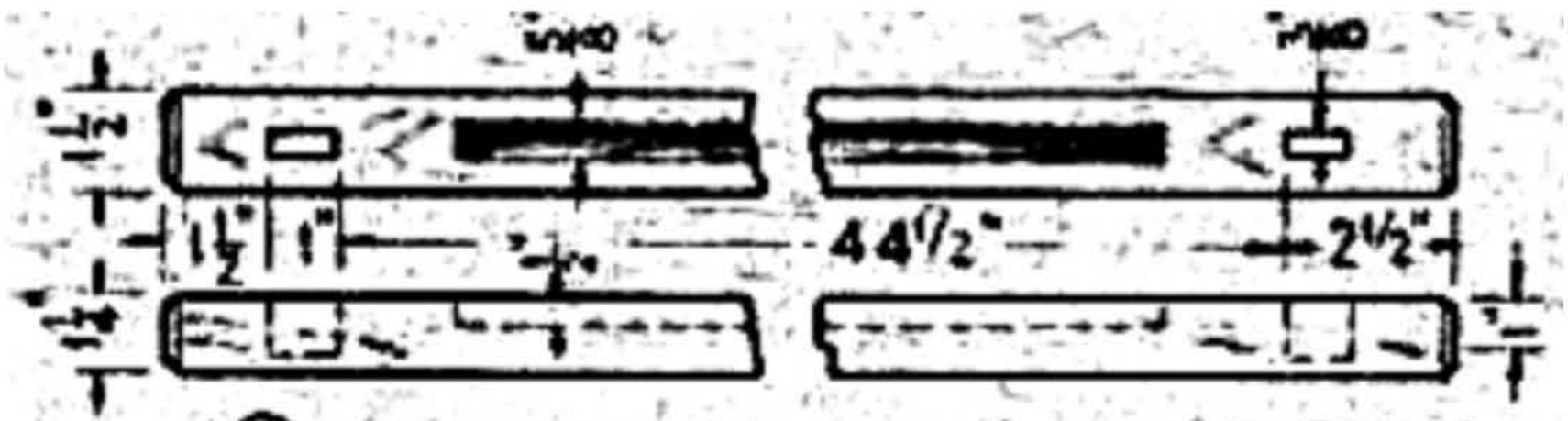


Ⓑ VERTICAL STICKS ON BEATER (2 REQ'D.)

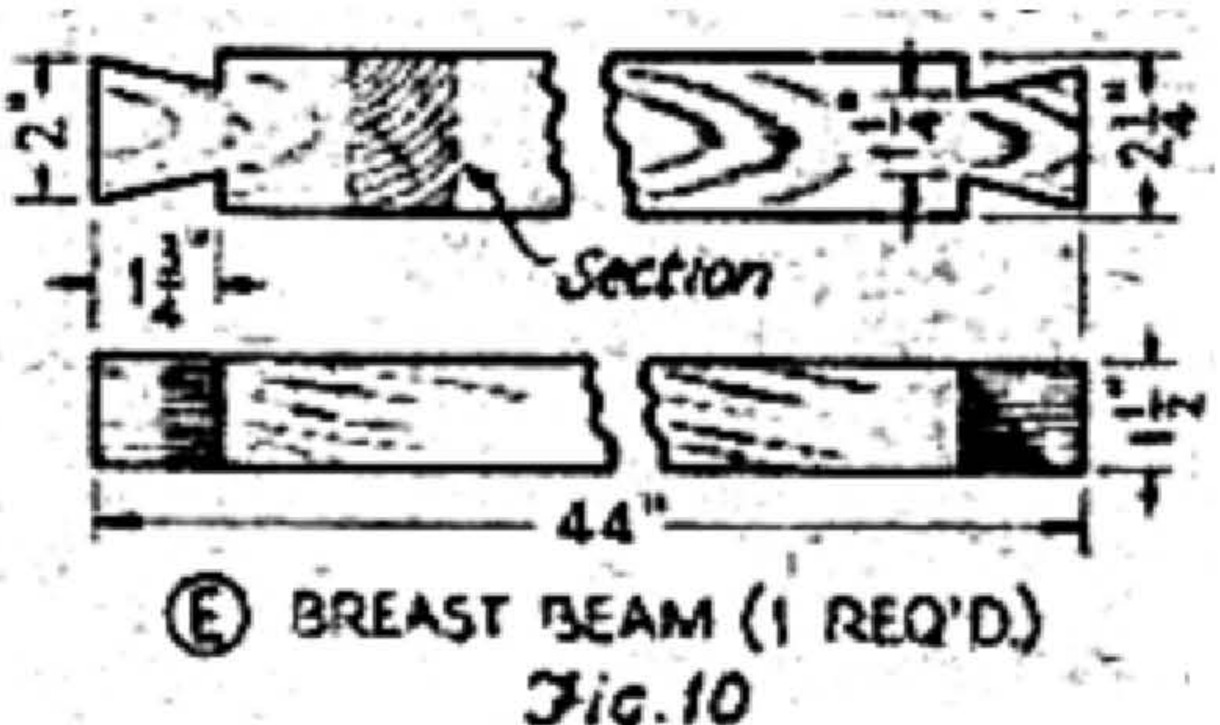
Fig. 7



Ⓒ REED BAR (1 REQ'D.) Fig. 8

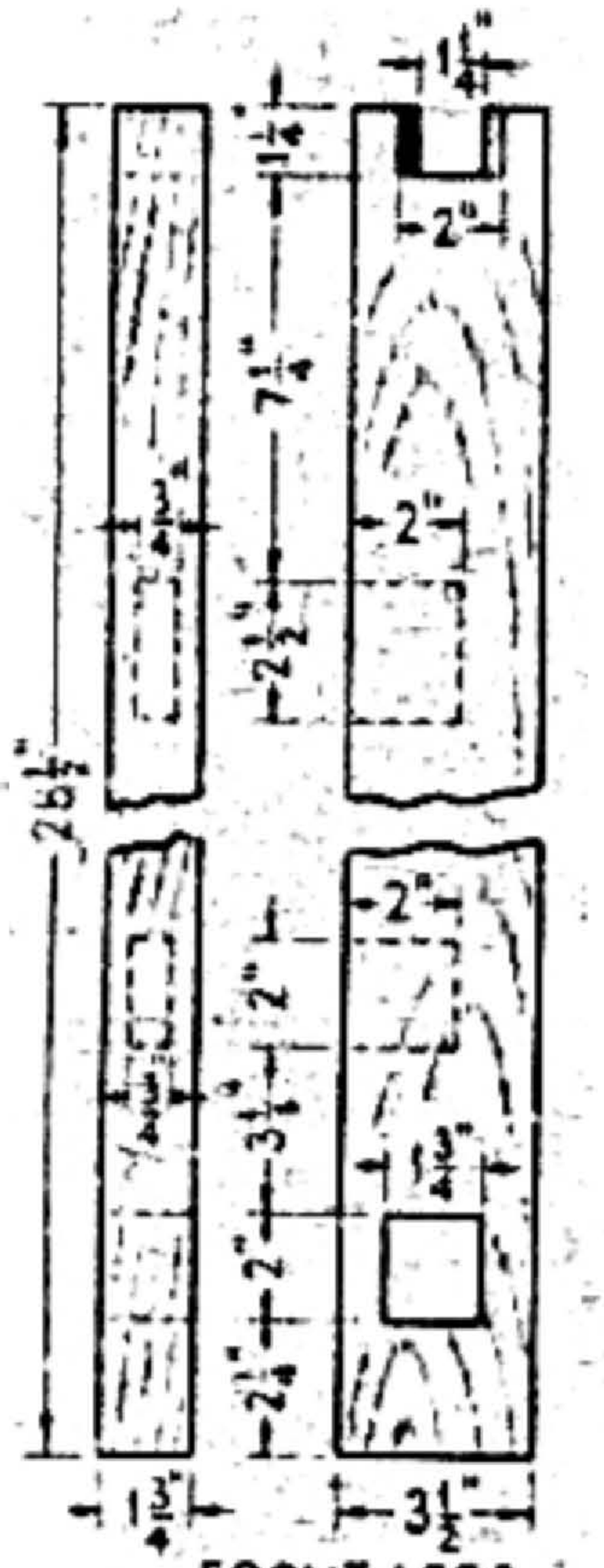


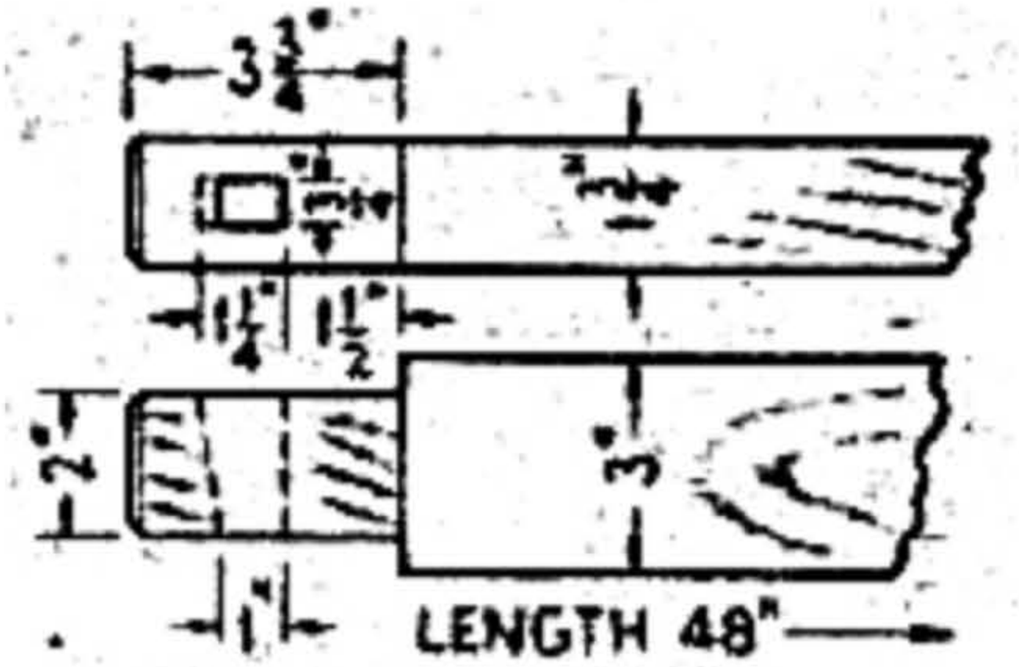
Ⓓ LOWER BEATER BAR (1 REQ'D) Fig. 9



Ⓔ BREAST BEAM (1 REQ'D.)

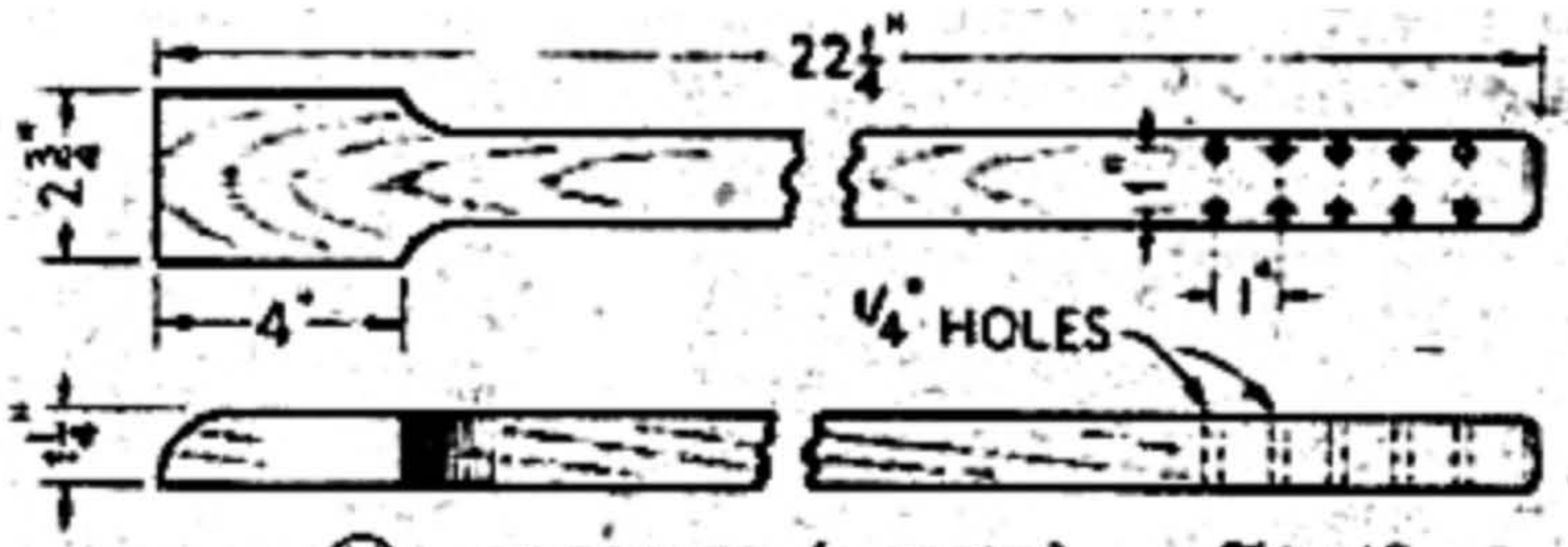
Fig. 10


1¼"
2"
2½"
2"
2"
2

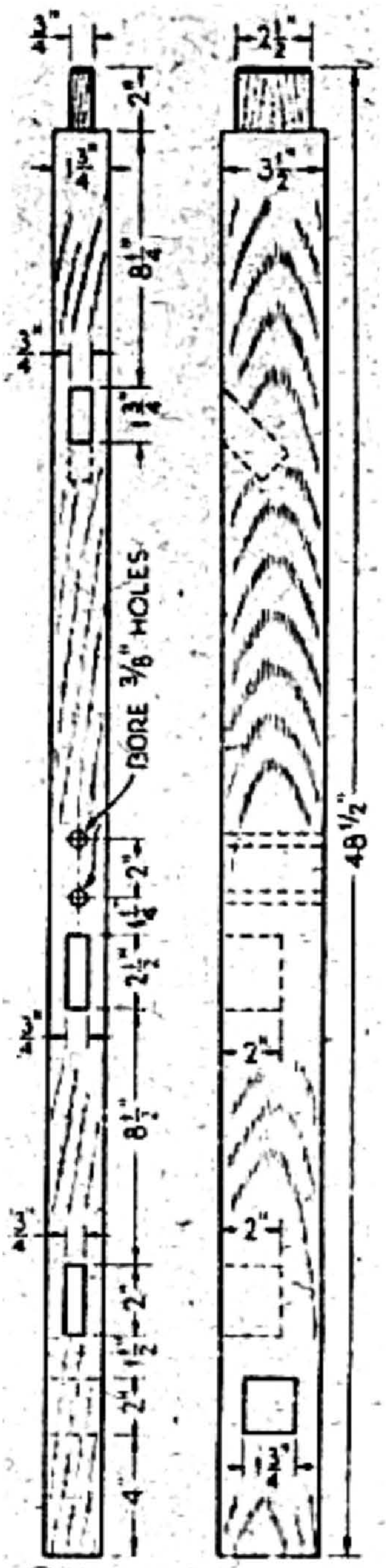


(G) FRONT AND REAR STRETCHERS (2 REQ'D)

Fig. 12

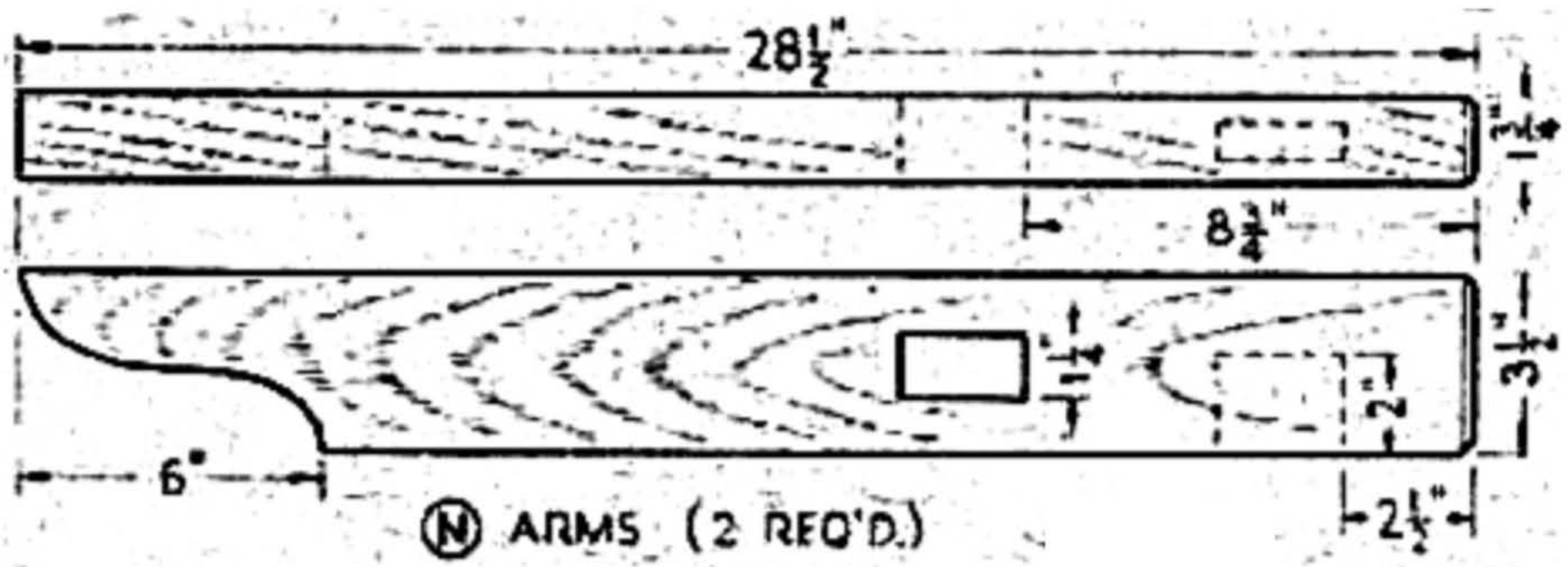


(H) TREADLES (4 REQ'D.) Fig. 13



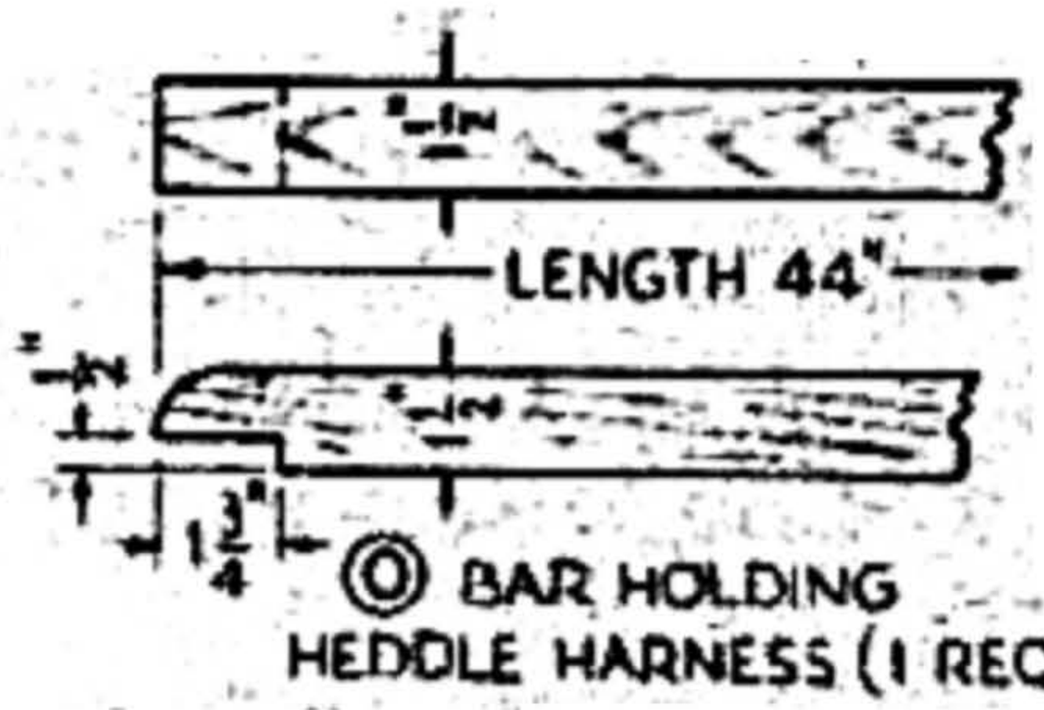
Ⓜ BACK LEGS (2 REQ'D.)

Fig. 14



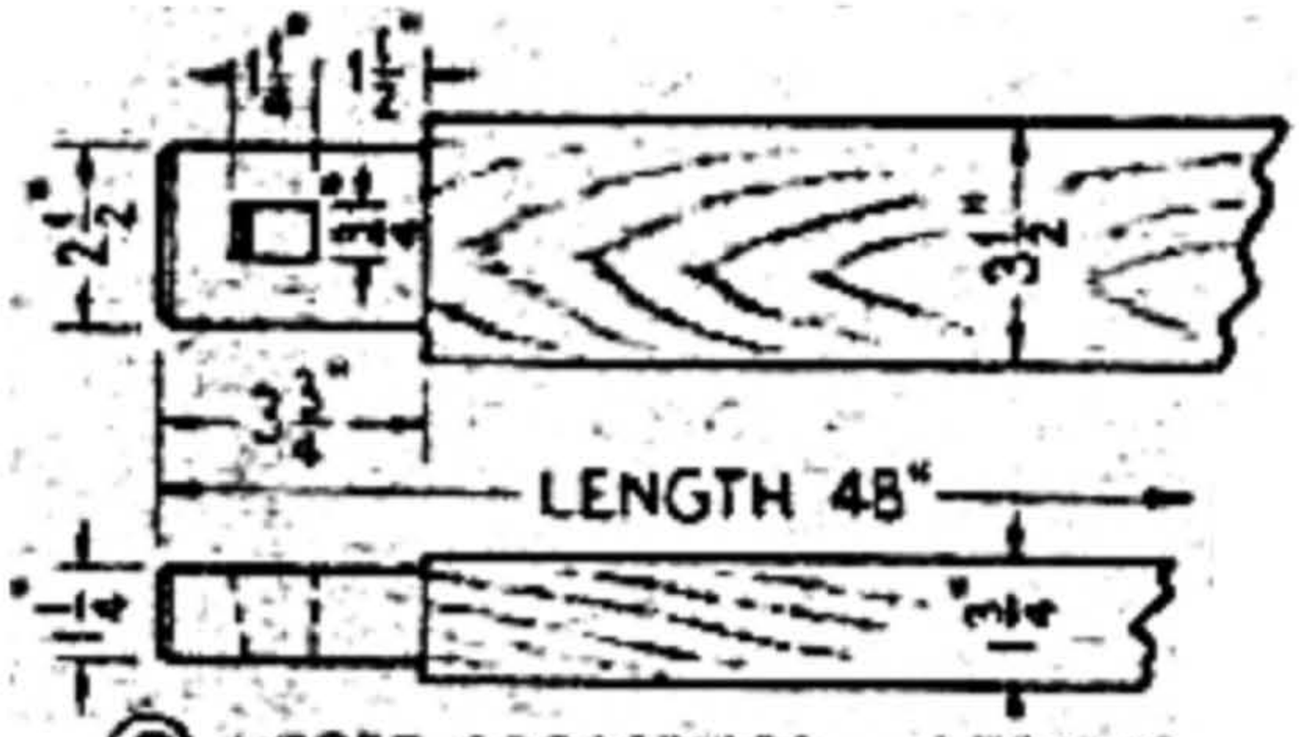
Ⓝ ARMS (2 REQ'D.)

Fig. 15



Ⓚ BAR HOLDING
HEDDLE HARNESS (1 REQ'D.)

Fig. 16



Ⓟ UPPER CROSSPIECE and FRAME
BRACE (1 REQ'D.)

Fig. 17

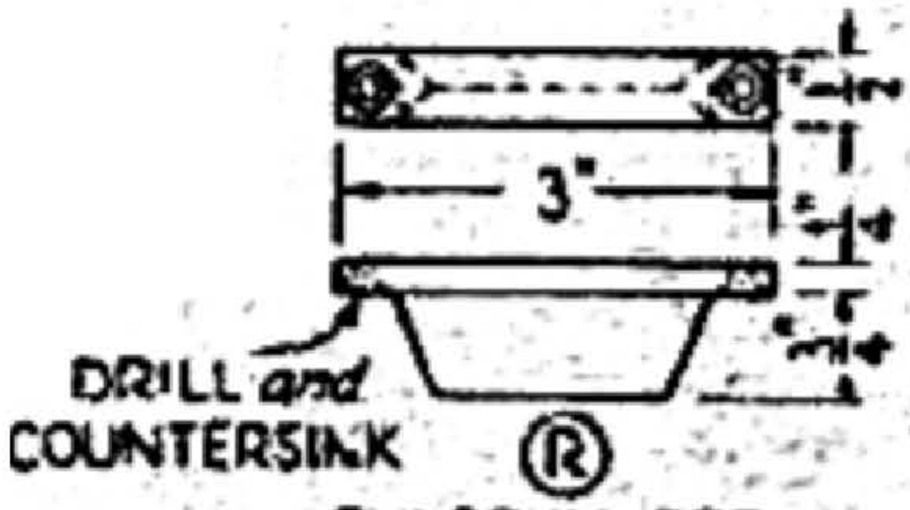


Fig. 18

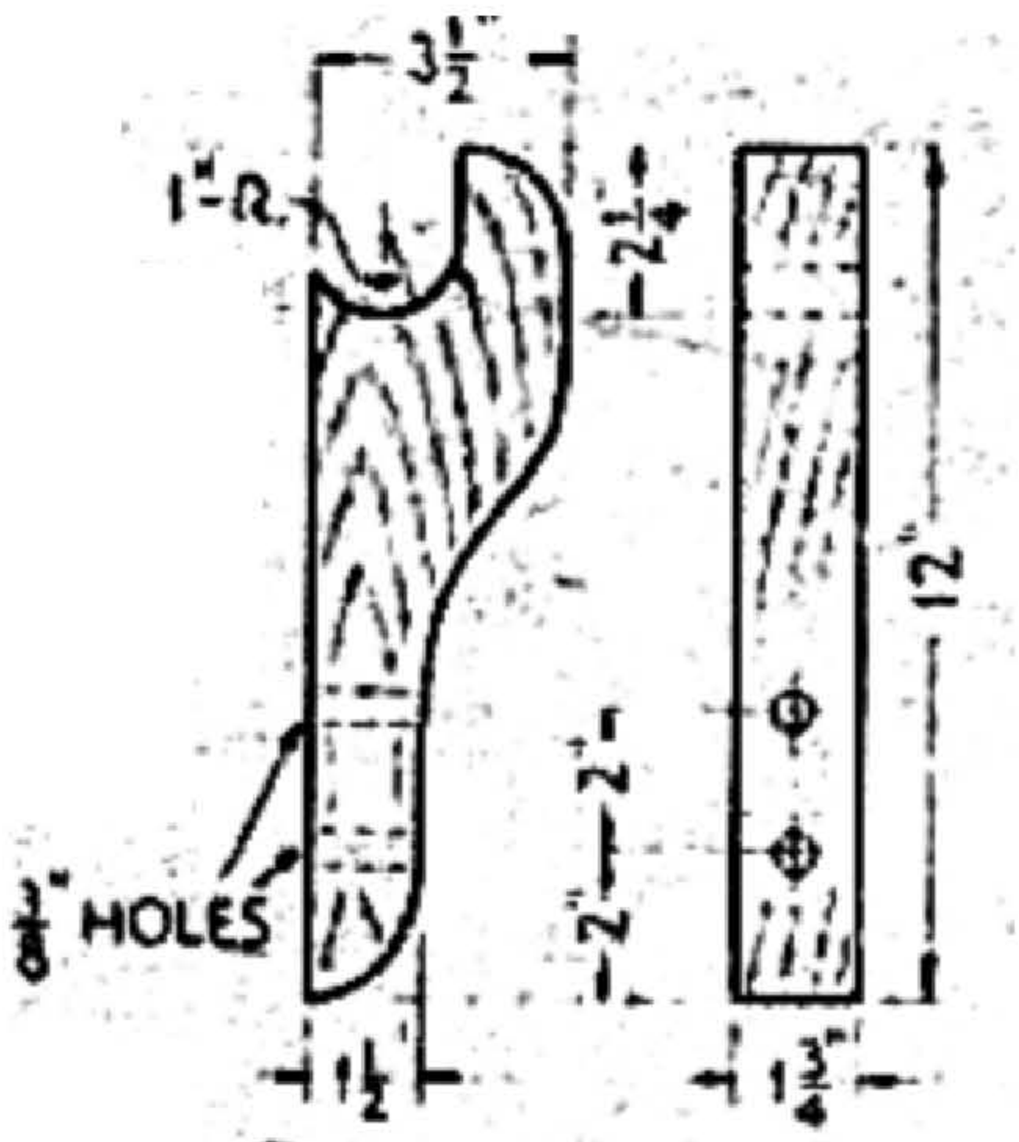


Fig. 19

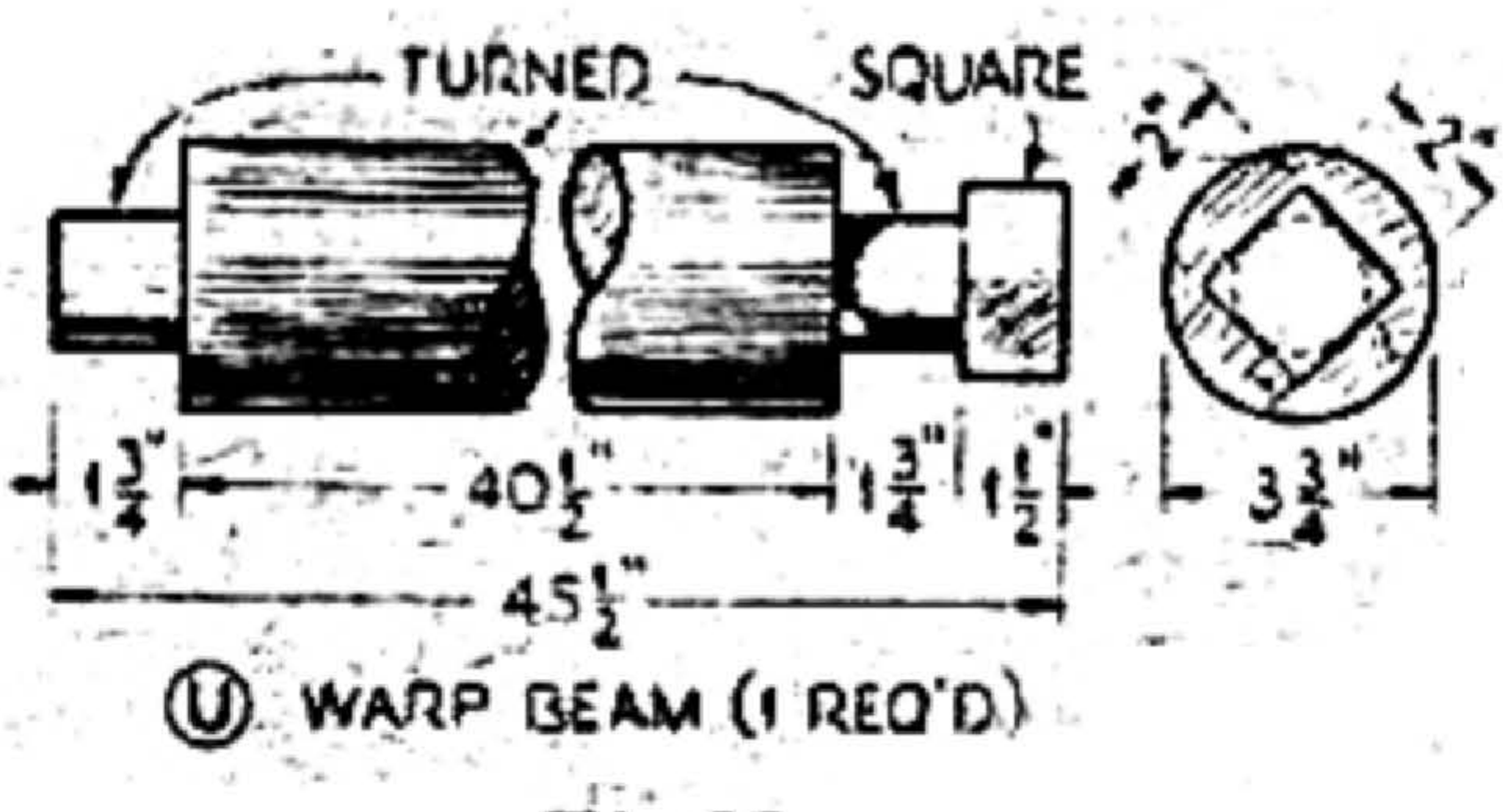


Fig. 20

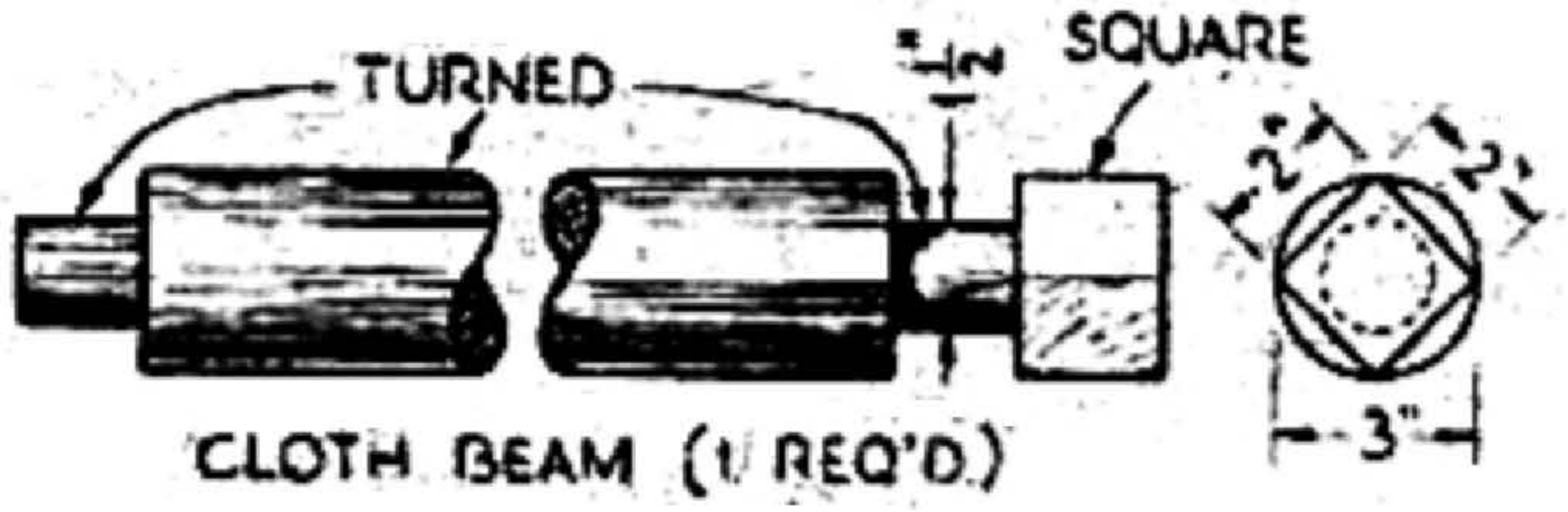
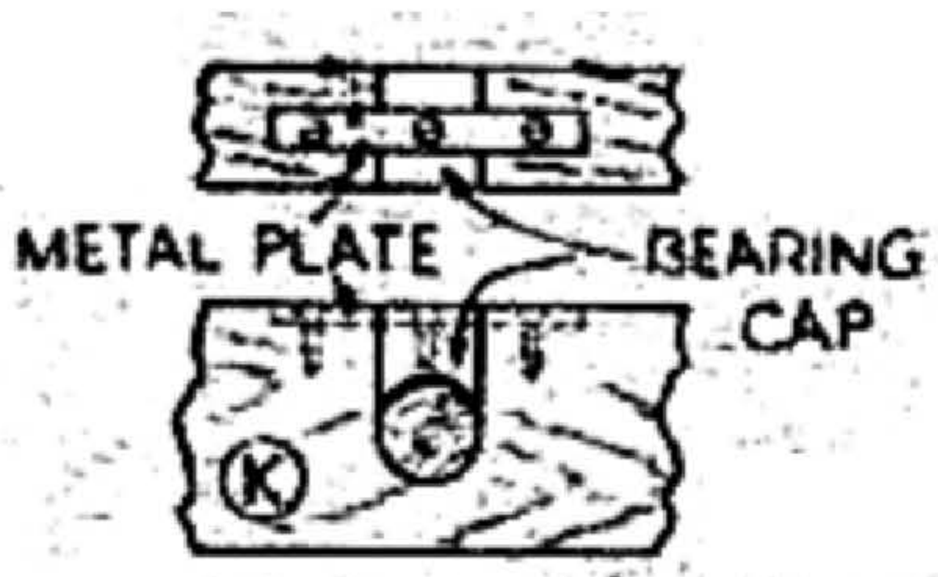


Fig. 21



Shows Method of Fastening Bearing Cap Over Cloth Beam at Right End

Fig. 22

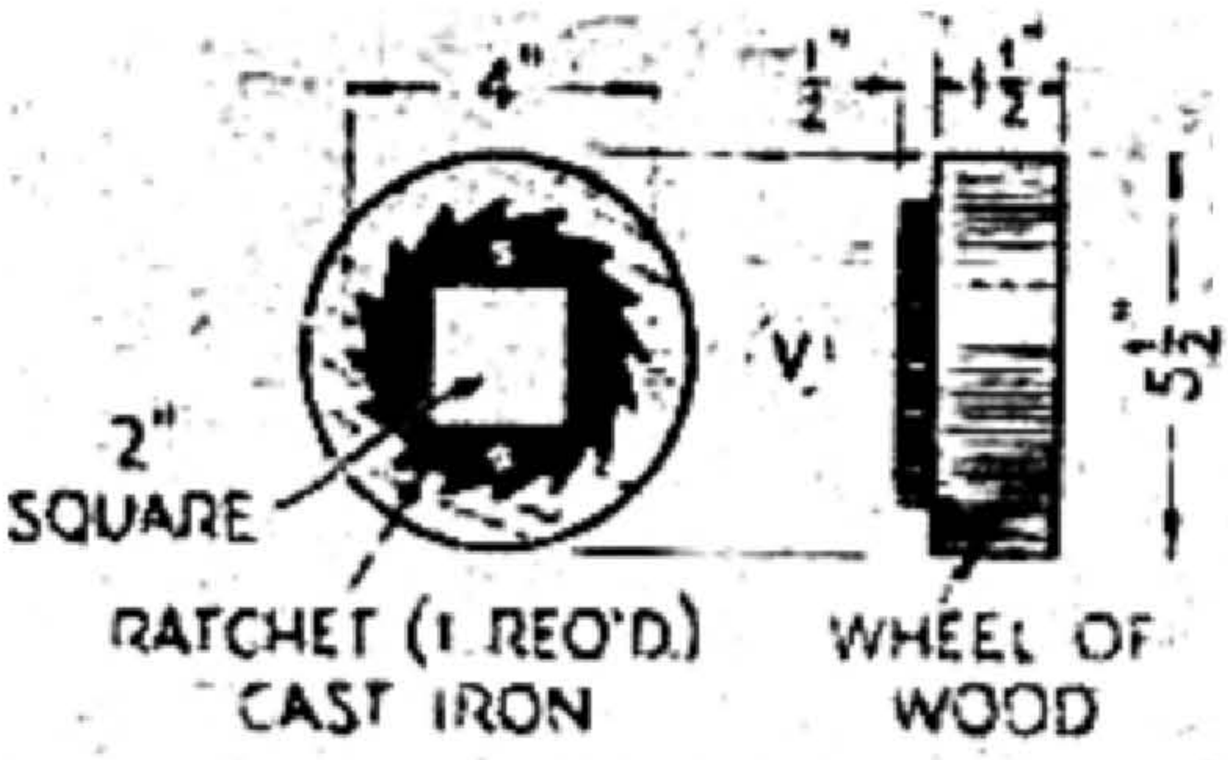
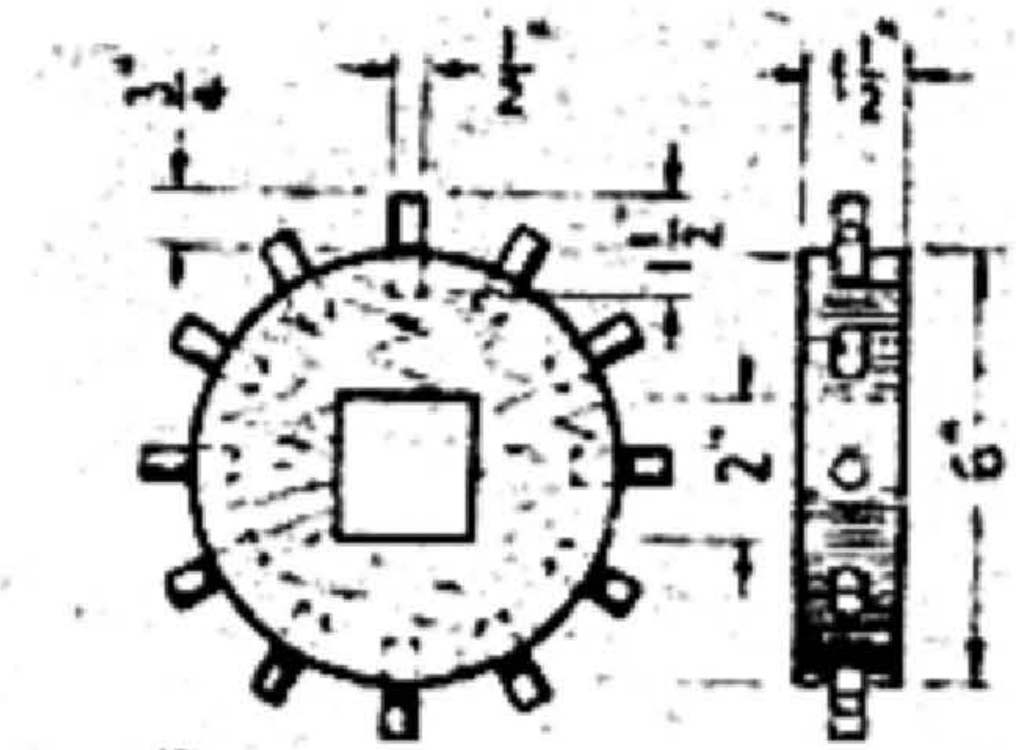
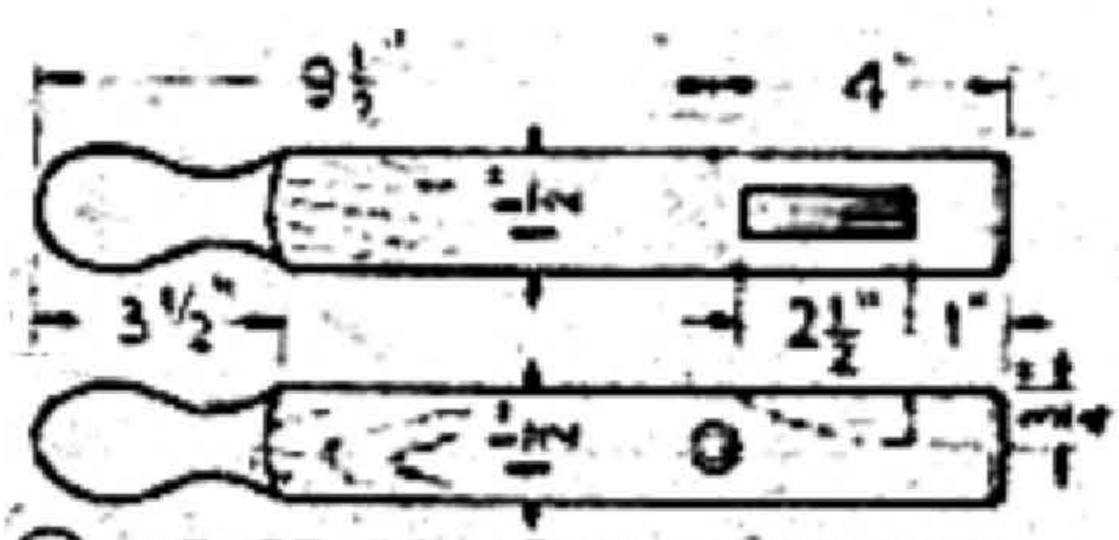


Fig. 23



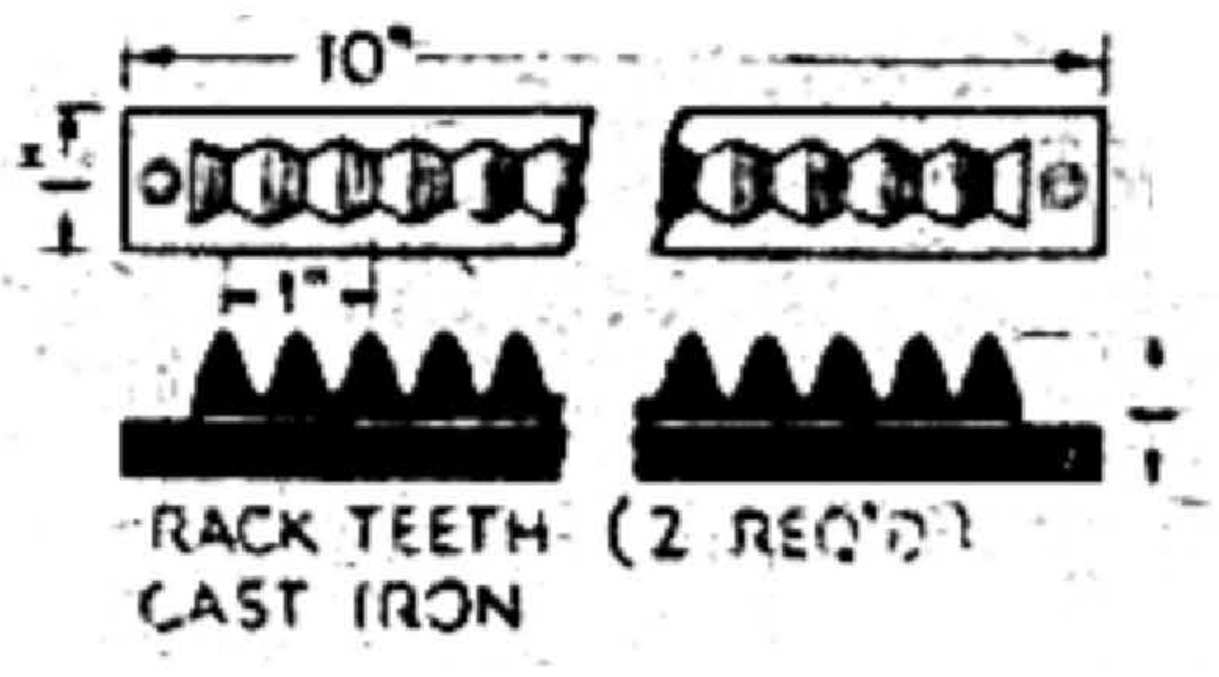
(W) RATCHET FOR
WARP BEAM (1 REQ'D)

Fig. 24



(X) LEVER TO HOLD WARP BEAM

Fig. 25



RACK TEETH (2 REQ'D)
CAST IRON

Fig. 26

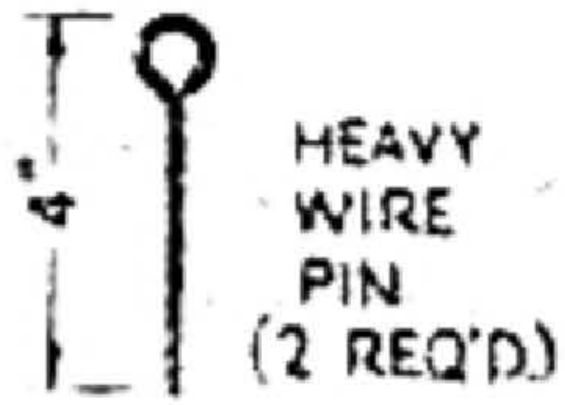
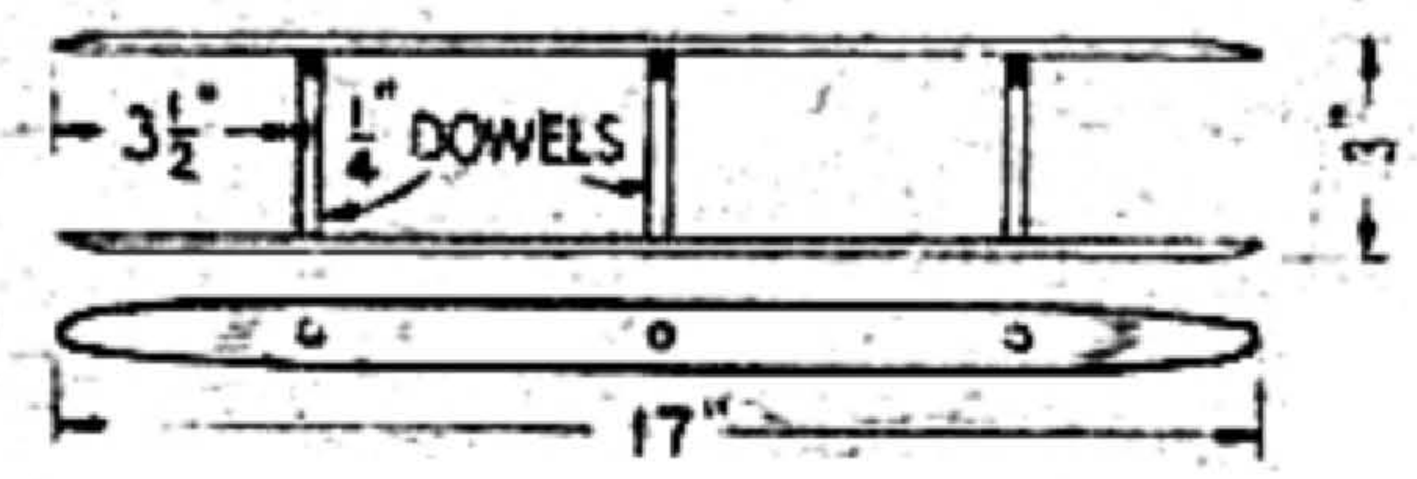
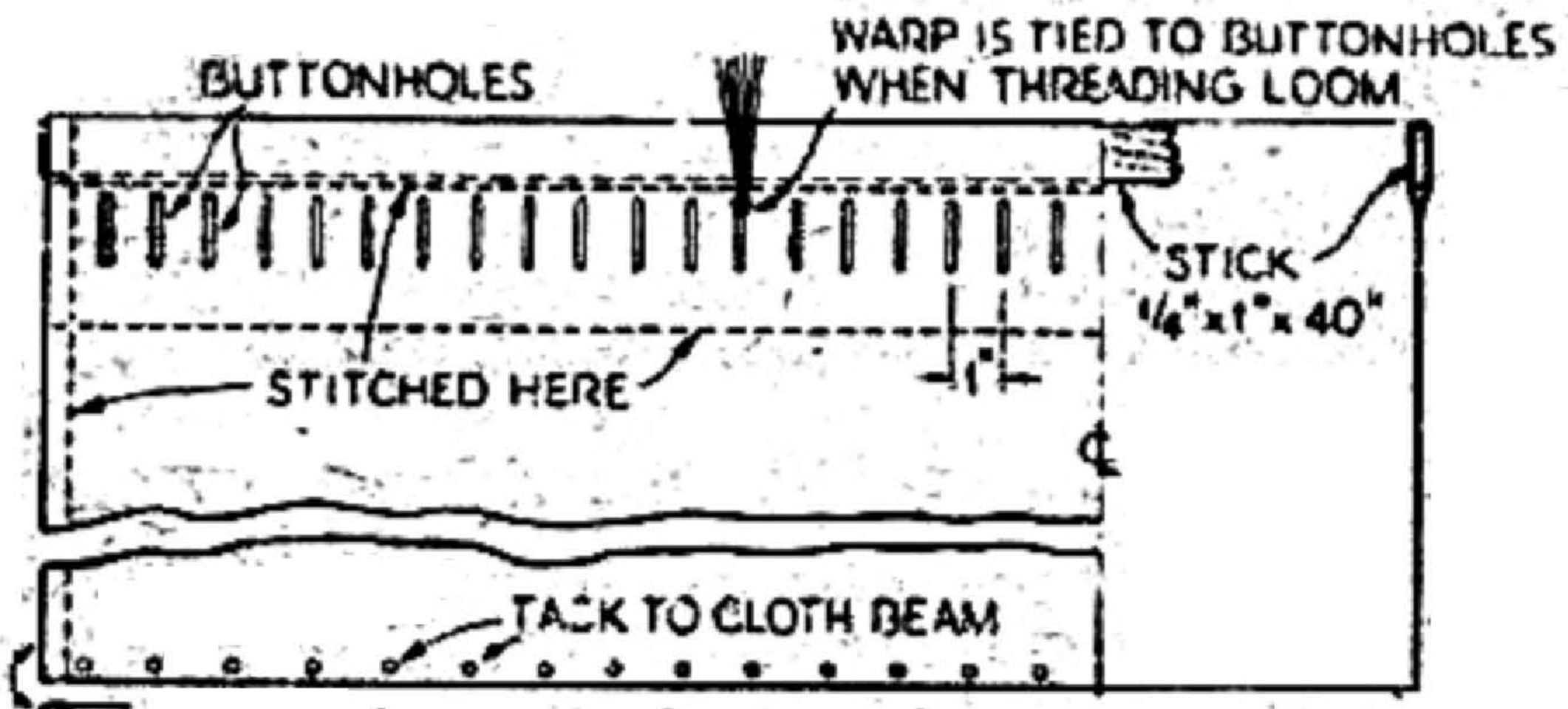


Fig. 27



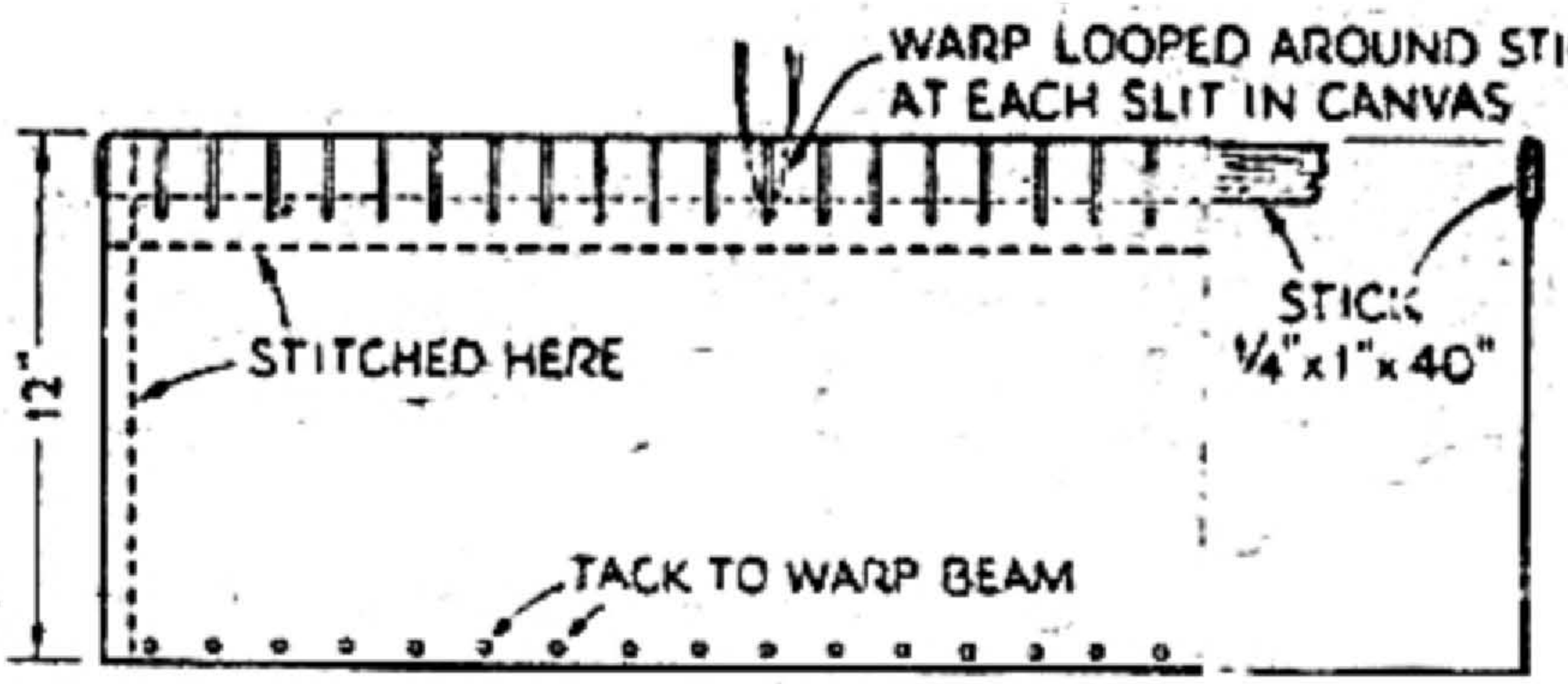
SHUTTLE (3 OR MORE REQ'D)

Fig. 28



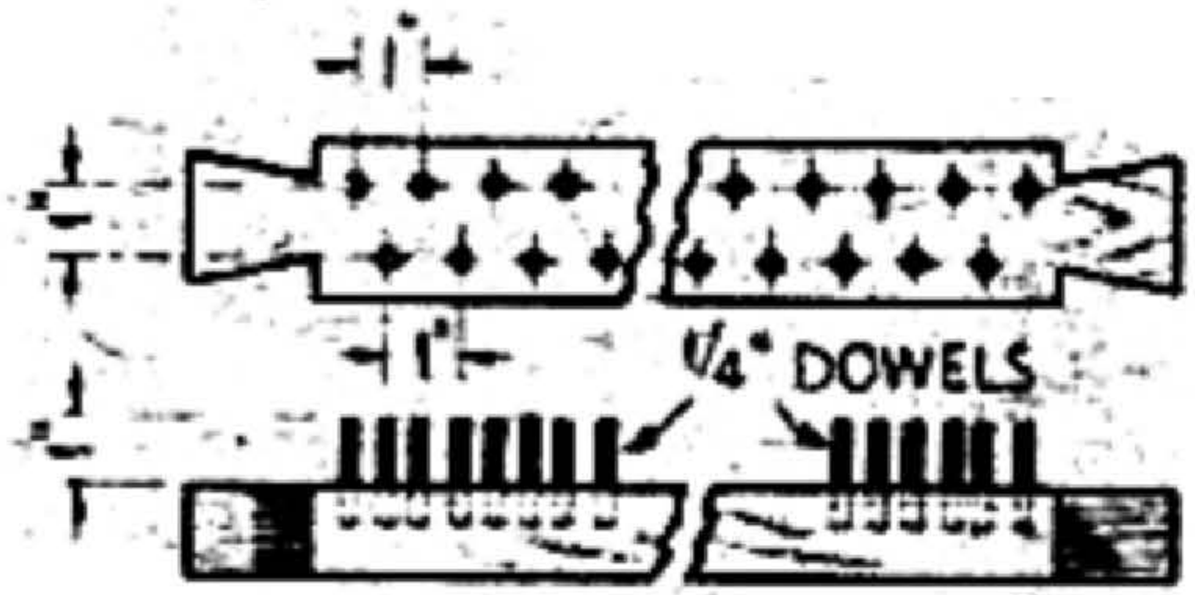
CANVAS (10 OZ. DUCK) 40" WIDE BY 30" LONG

Fig. 29



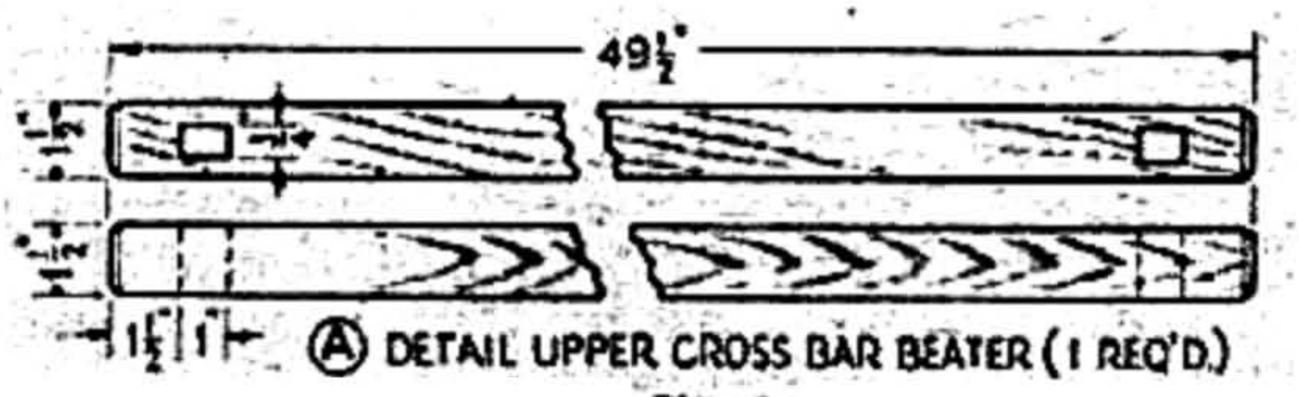
CANVAS FOR WARP BEAM

Fig. 30



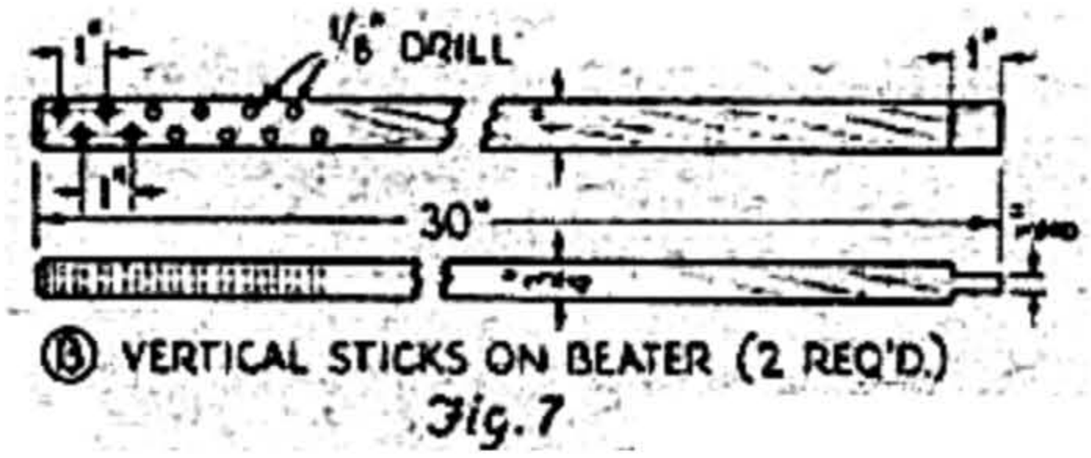
RADDLE. MADE SAME AS BREAST BEAM WITH PEGS ADDED. (1 REQ'D.)

Fig. 31



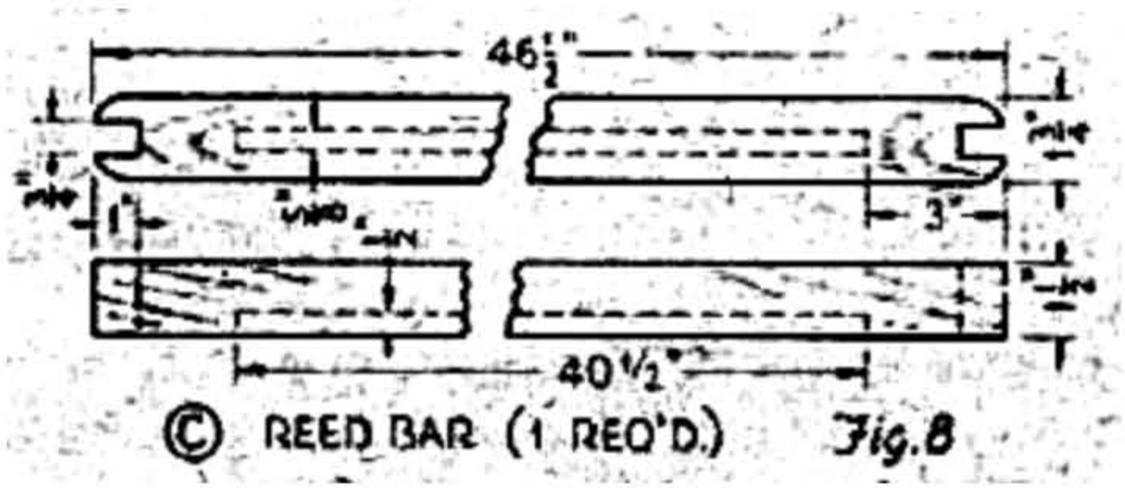
Ⓐ DETAIL UPPER CROSS BAR BEATER (1 REQ'D.)

Fig. 6

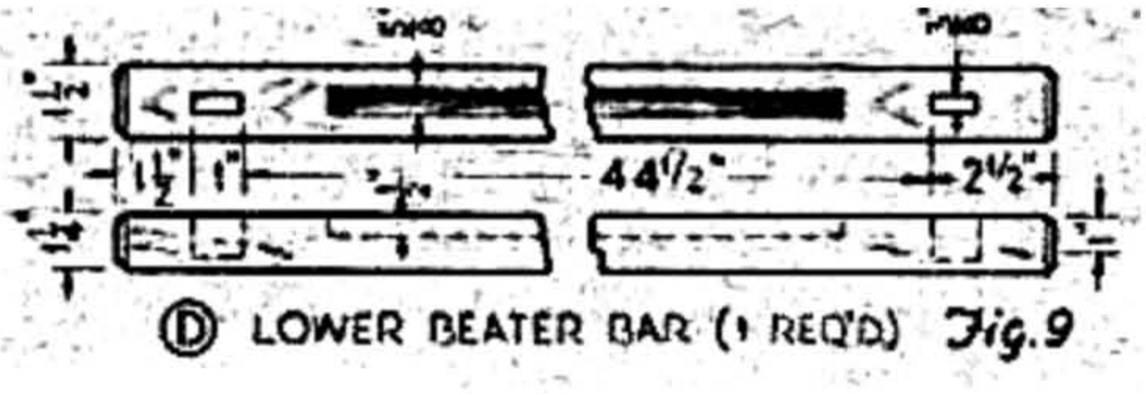


Ⓑ VERTICAL STICKS ON BEATER (2 REQ'D.)

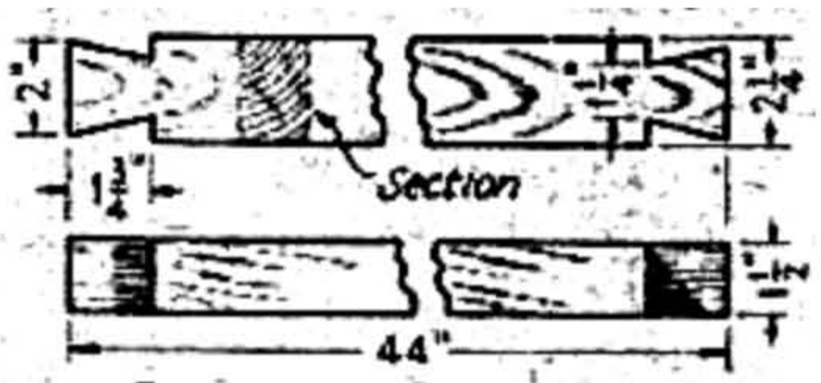
Fig. 7



Ⓒ REED BAR (1 REQ'D.) *Fig. 8*

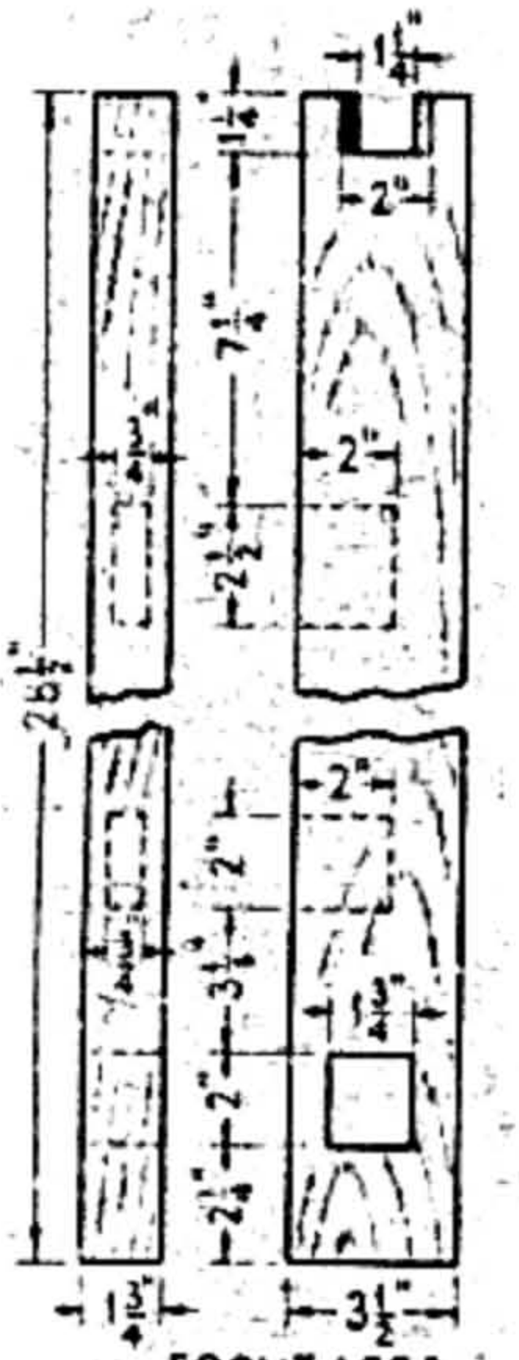


Ⓓ LOWER BEATER BAR (1 REQ'D) *Fig. 9*



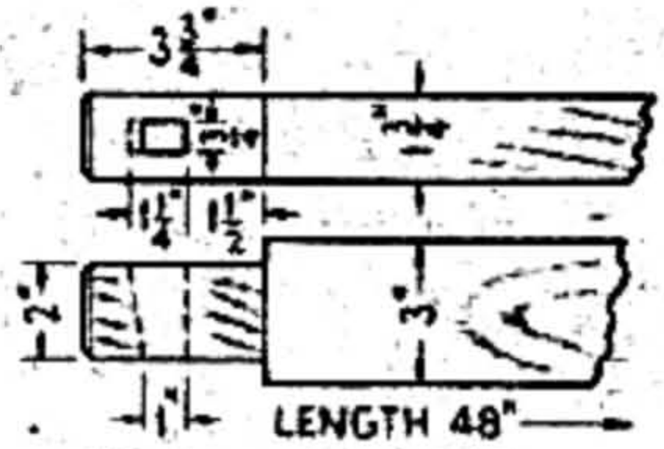
Ⓔ BREAST BEAM (1 REQ'D.)

Fig. 10



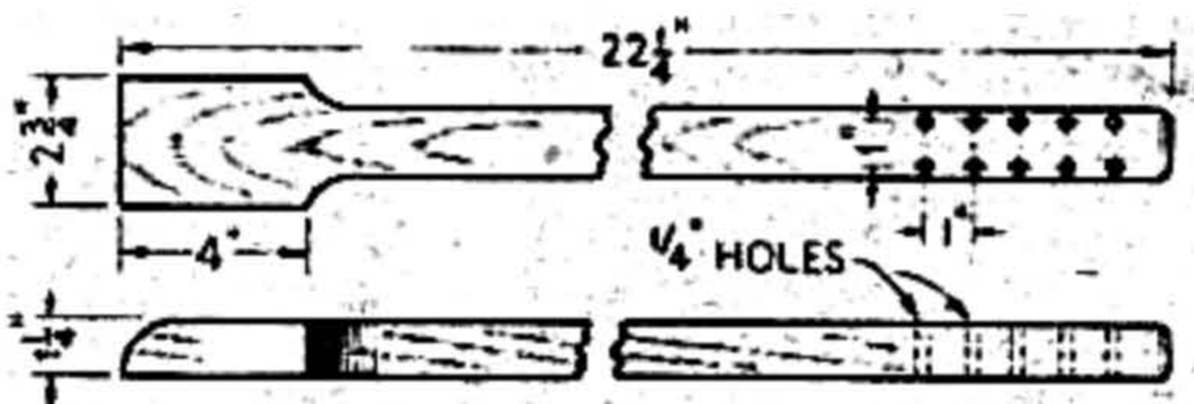
Ⓕ FRONT-LEGS (2 REQ'D.)

Fig. 11

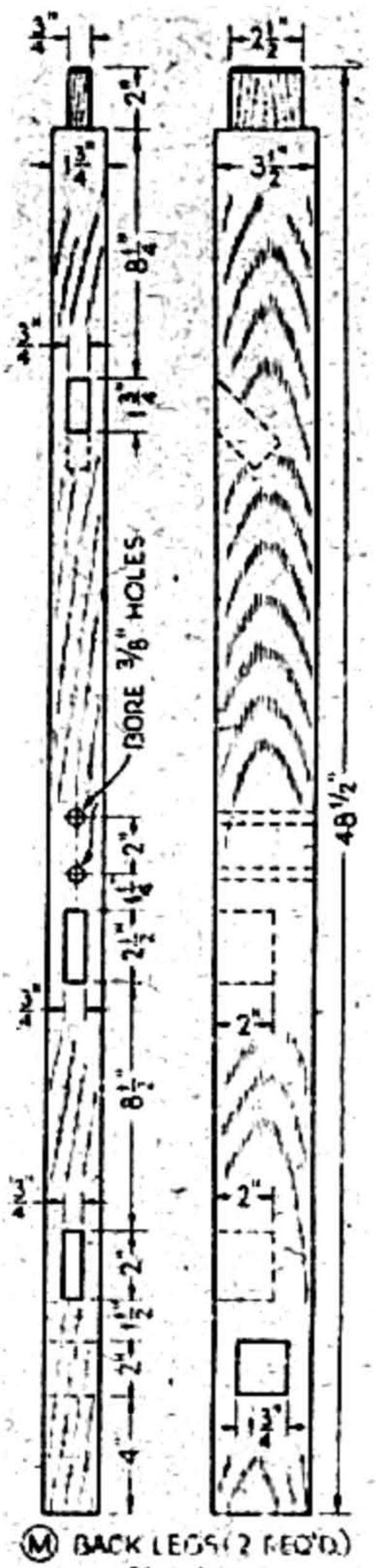


Ⓖ FRONT AND REAR STRETCHERS (2 REQ'D)

Fig. 12

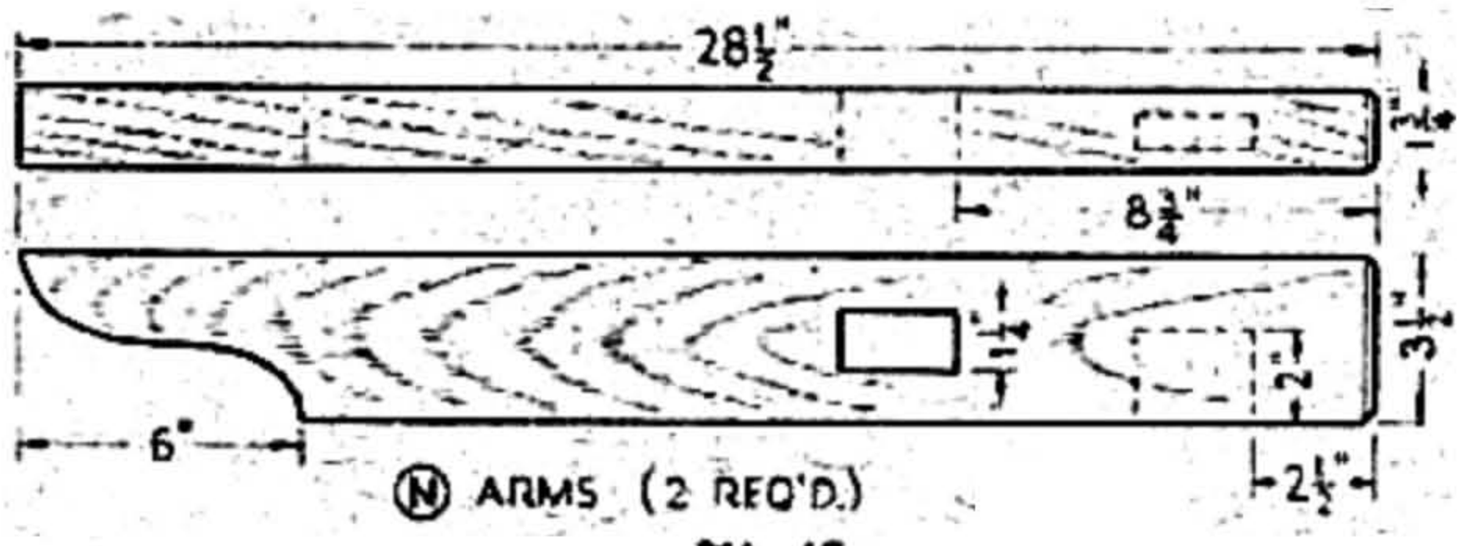


Ⓗ TREADLES (4 REQ'D.) Fig. 13



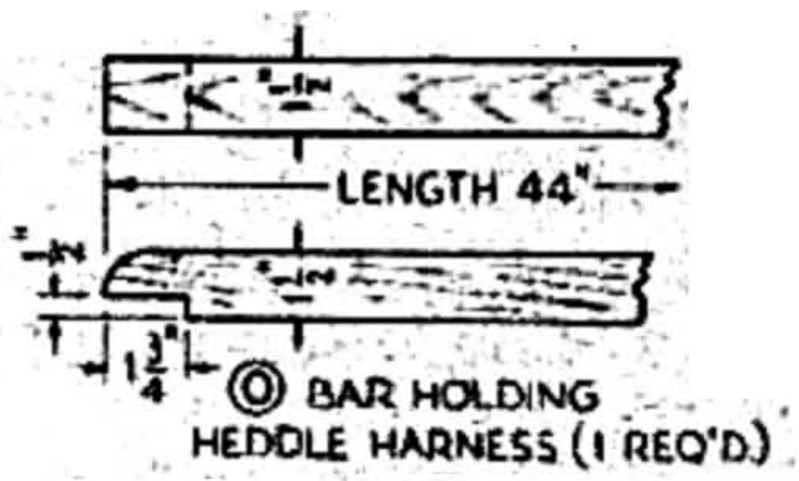
Ⓜ BACK LEGS (2 REQ'D.)

Fig. 14



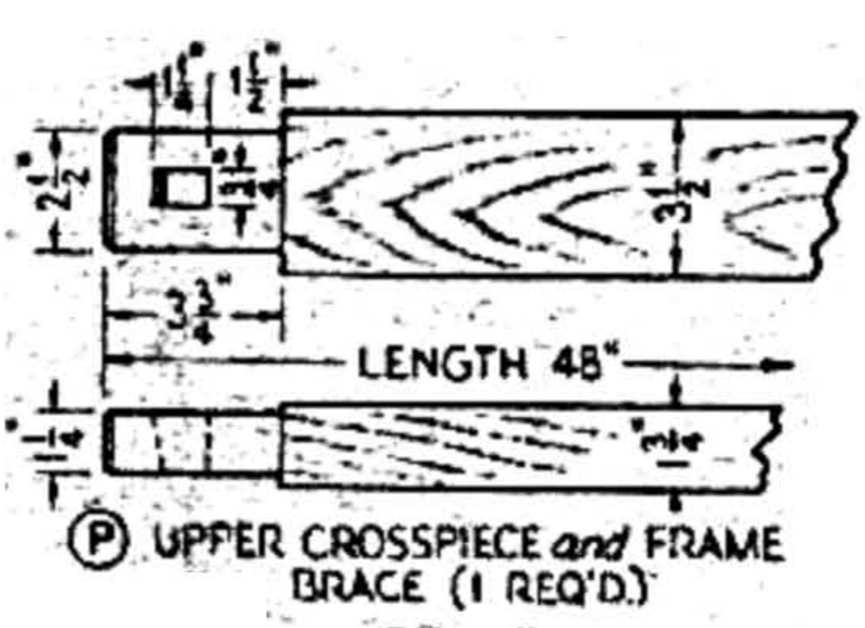
Ⓝ ARMS (2 REQ'D.)

Fig.15



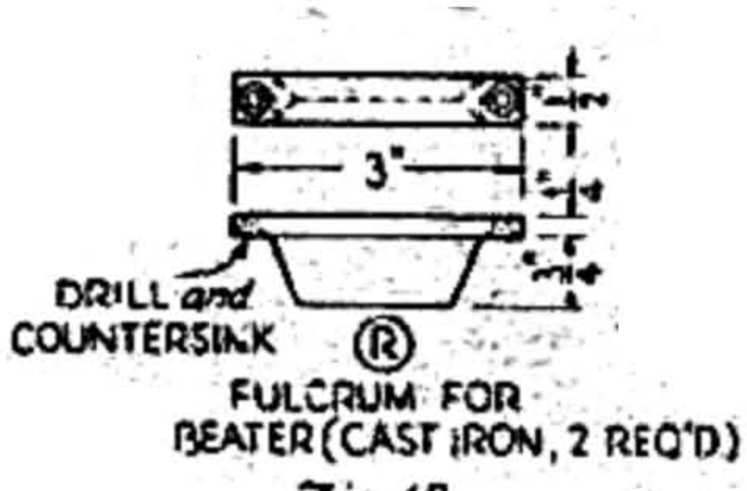
Ⓞ BAR HOLDING HEDDLE HARNESS (1 REQ'D.)

Fig.16



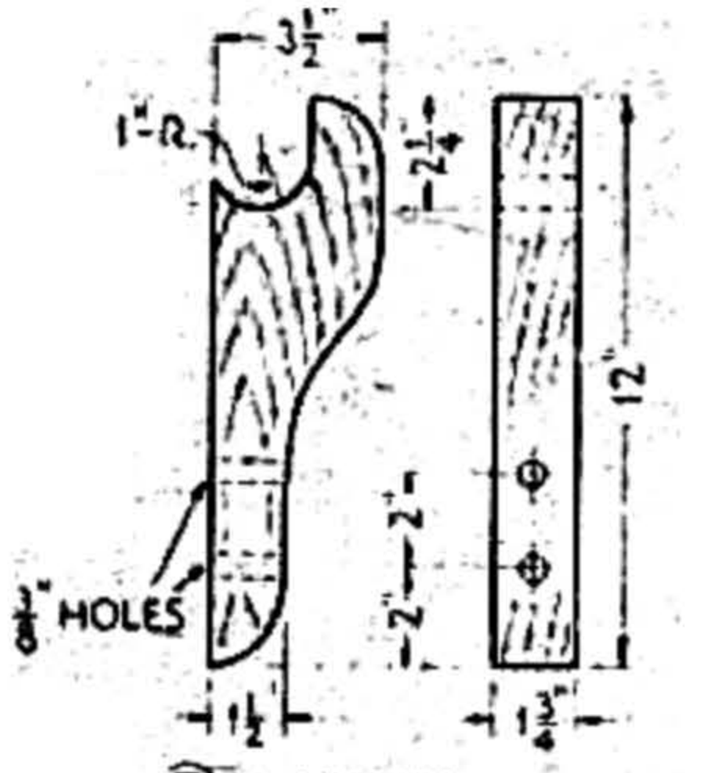
Ⓟ UPPER CROSSPIECE *and* FRAME BRACE (1 REQ'D.)

Fig.17



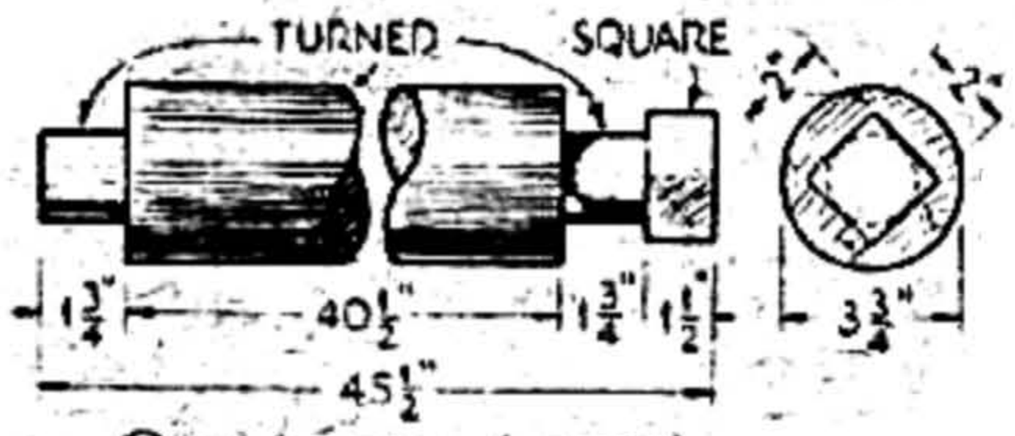
Ⓡ FULCRUM FOR BEATER (CAST IRON, 2 REQ'D)

Fig.18



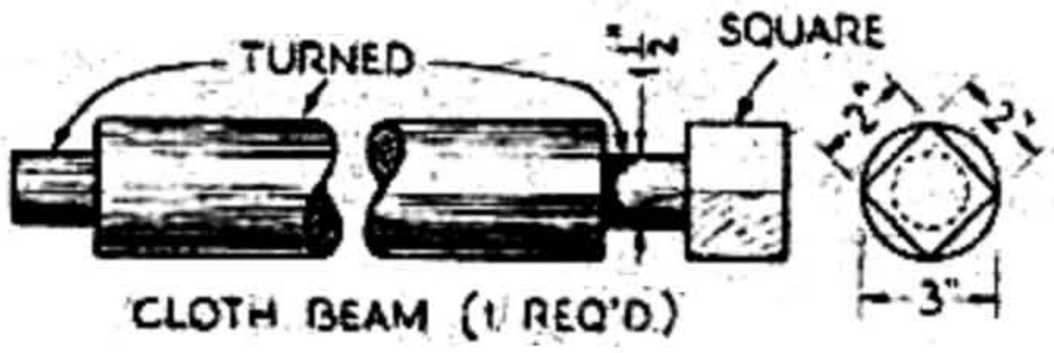
Ⓣ WARP BEAM BEARING

Fig.19



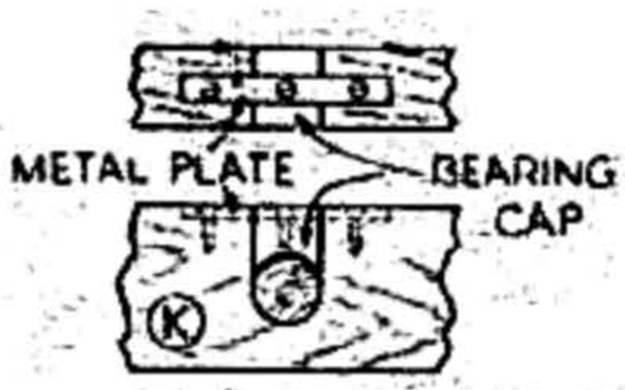
Ⓤ WARP BEAM (1 REQ'D)

Fig. 20



CLOTH BEAM (1 REQ'D.)

Fig. 21



Shows Method of Fastening Bearing Cap Over Cloth Beam at Right End

Fig. 22

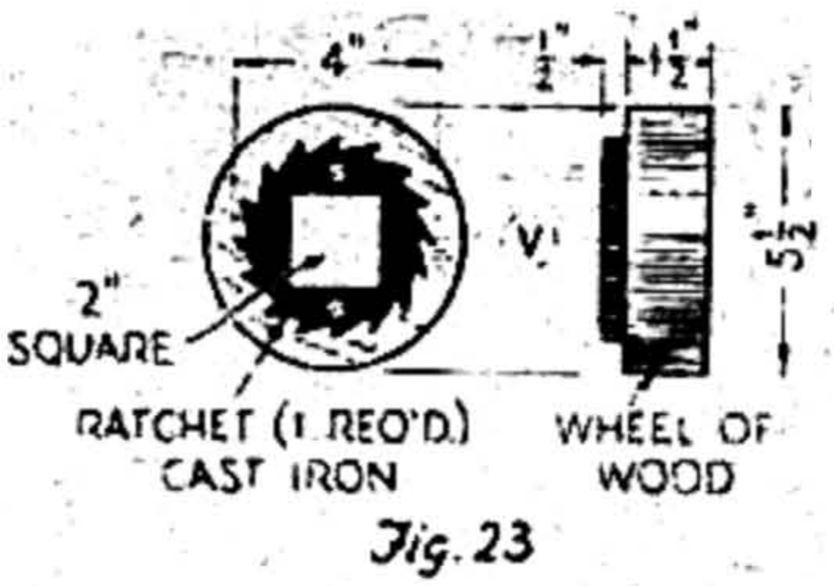
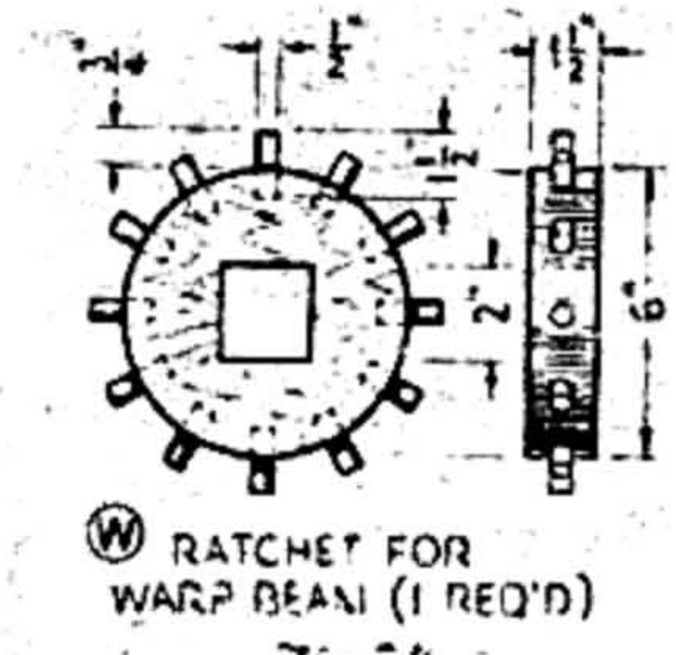
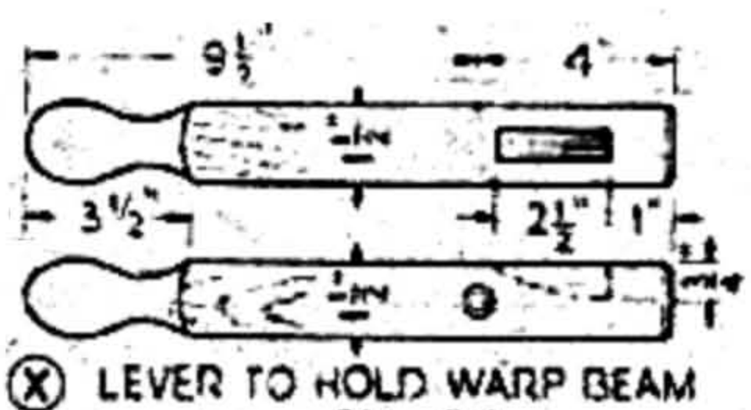


Fig. 23



Ⓦ RATCHET FOR WARP BEAM (1 REQ'D)

Fig. 24



Ⓧ LEVER TO HOLD WARP BEAM

Fig. 25

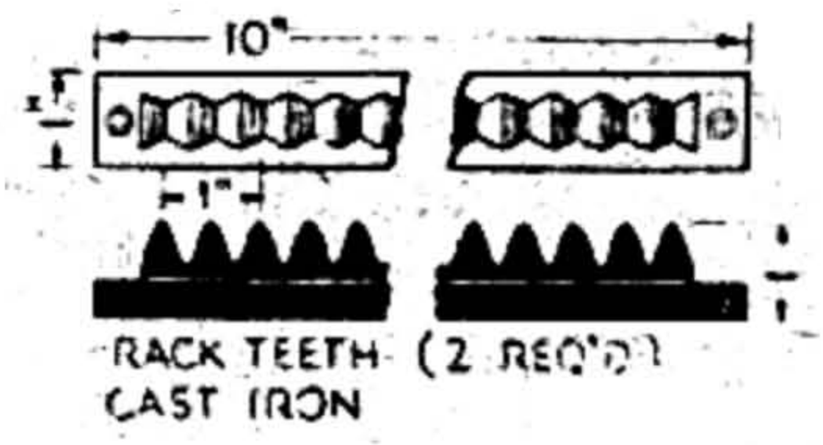


Fig. 26

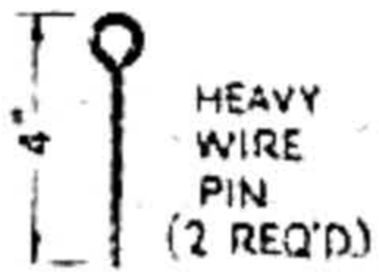
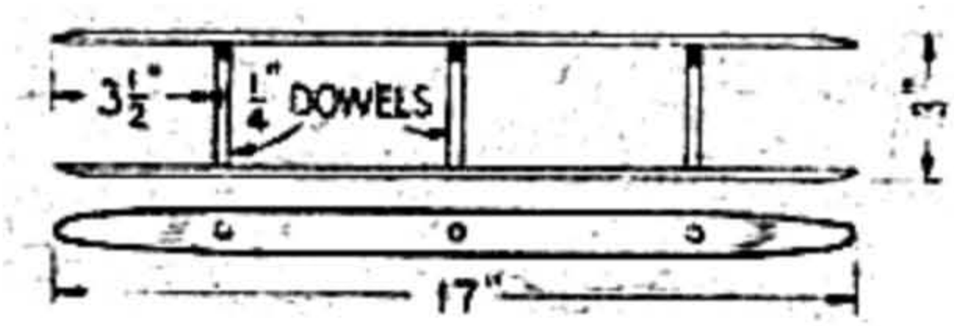
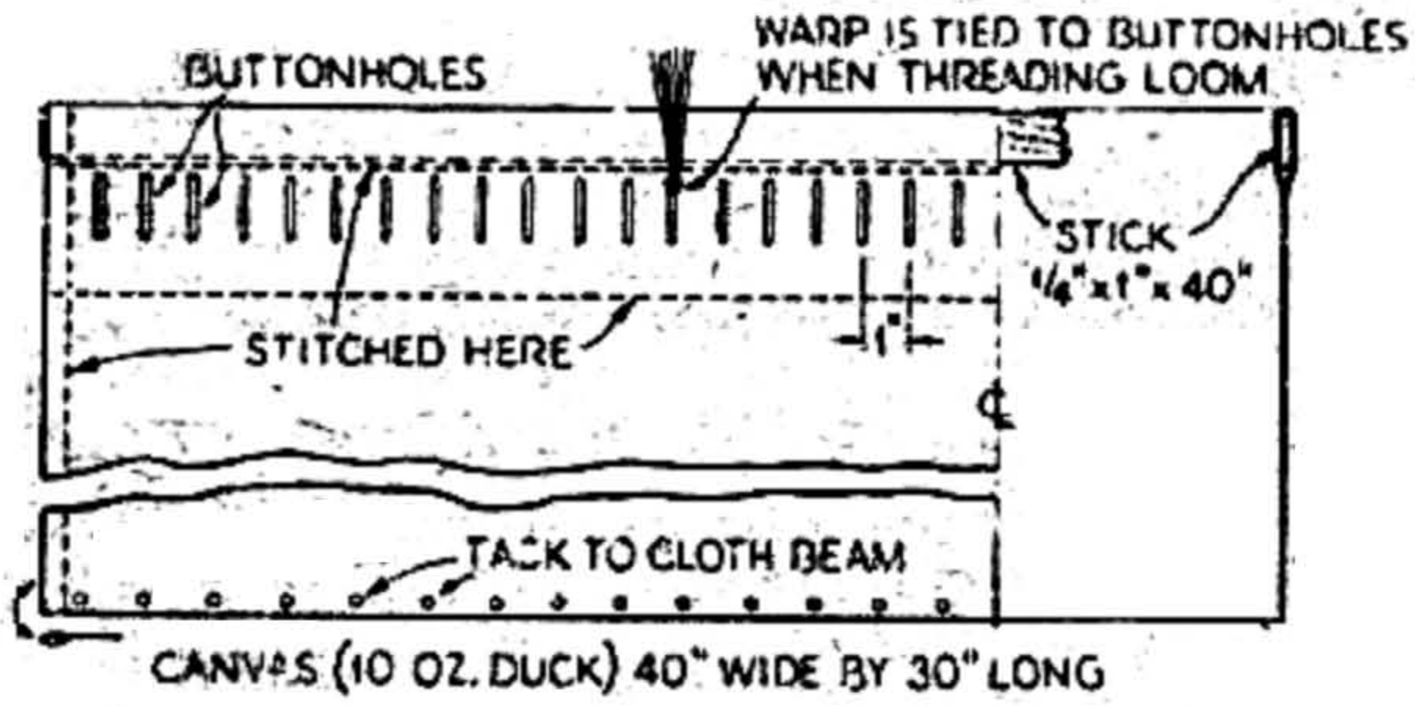


Fig. 27



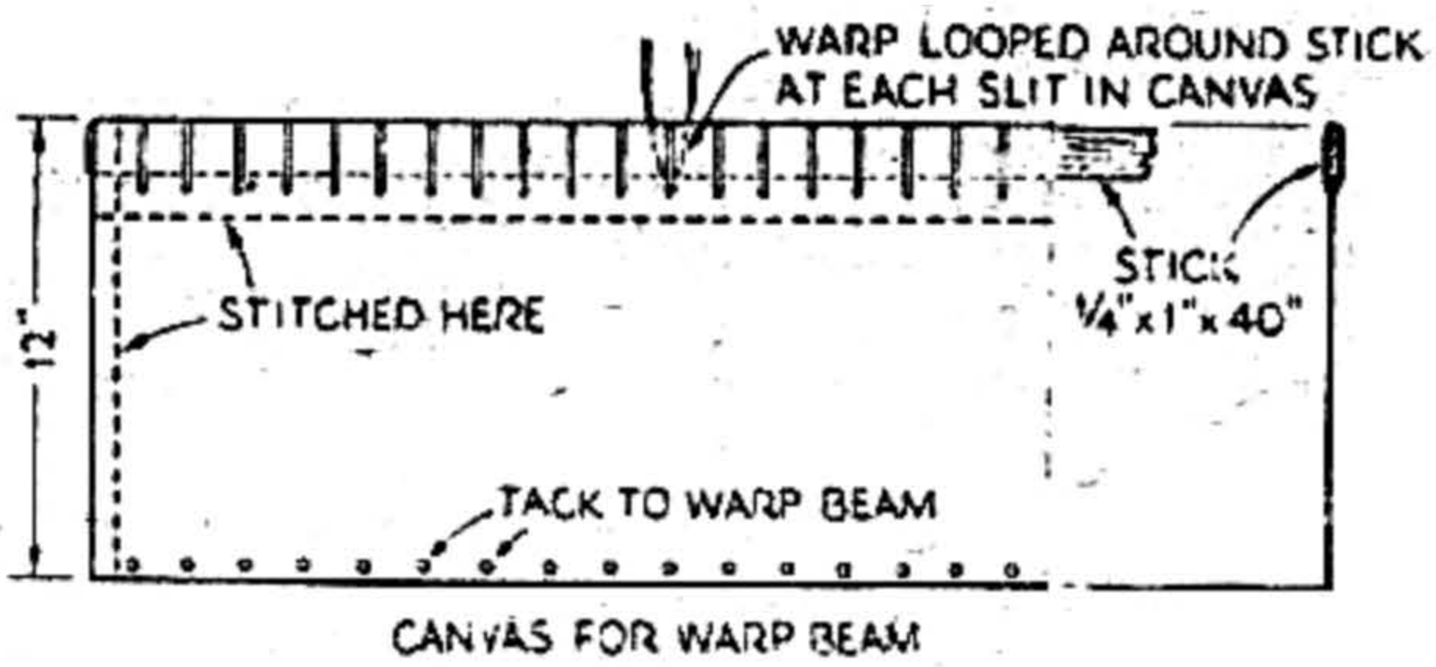
SHUTTLE (3 OR MORE REQ'D)

Fig. 28



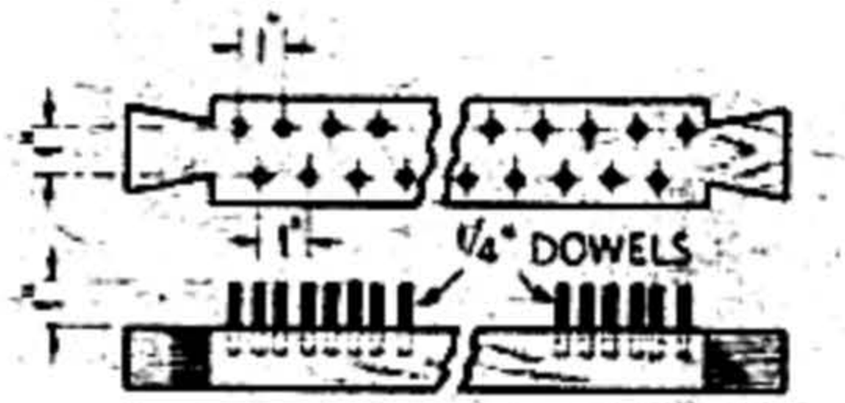
CANVAS (10 OZ. DUCK) 40" WIDE BY 30" LONG

Fig. 29



CANVAS FOR WARP BEAM

Fig. 30



RADDLE. MADE SAME AS BREAST BEAM WITH PEGS ADDED. (1 REQ'D.)

Fig. 31